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Contents

PAGE

EDITORIAL NOTES: The Great Dye "Combine": Reduced Fares to the B.I.F.; Standardisation of Colliery Requisites: Reparation Recovery 109
Chemists' Claim for Mustard Gas Production 112
The Chemistry of Colloids 115
Preparation of Fused Silica 116
Growth of Canadian Chemical Industry 116
CORRESPONDENCE: Chemists and Advertising 117
From Week to Week 119
References to Current Literature 120
Patent Literature 121
Market Reports and Current Prices 124
Scottish Chemical Market 127
Company News: Trade Inquiries 129
Commercial Intelligence: New Companies Registered 130

NOTICES.—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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The Great Dye "Combine"

THE discussion in the daily press on what is described as the "Anglo-German dye combine" has become exciting, and the excitement in most cases is proportionate to lack of acquaintance with the facts. Now we have Dr. Herty of New York coming in with a fiery appeal to fight Germany, though one would have thought he had enough to do to fight German influence in the States. Until the facts are known it would be advisable for everyone to keep cool and suspend judgment. The original announcement of the "combine" is described by the British Dyestuffs Corporation as "unauthorised and premature." It is, however, common knowledge that negotiations with German dyestuff interests have been in progress for some time. Reference, in fact, was made to the subject at the B.D.C. ordinary general meeting in 1922, and the shareholders, we are told, will be informed of the result of the negotiations as soon as there is anything definite to communicate. The negotiations, it may be recalled, were started from the German side, and the fact that the once all-powerful I.G. now seeks an understanding with the British industry, only in its present form, a few years old, is sufficient proof of the change in the British position which the hard work of the past few years has wrought.

It is futile to discuss any agreement in detail until its terms are known, but some general conditions may, perhaps, be considered. The first, it seems to us, is that any such agreement should be judged from the national point of view, and that all the interests concerned should be collectively considered. These are mainly the whole body of British dyestuff manufacturers, since the industry must be considered as a whole, the whole body of British colour users, who are now well organised, and the Board of Trade, representing the Government as shareholders in the B.D.C. and the general national interest. In addition there is the important interest of British chemical science, since the dyestuffs industry is necessarily one of the most important schools of organic chemistry, and a little further removed we have the merchant class, whose business as importers and distributors must be indirectly affected. The colour users, as a class, have been loyal to the dyestuff manufacturers and to the idea of a British industry, and obviously it would be right that their interests should be very carefully considered. Equally entitled to consideration are the considerable group of independent manufacturers, who now constitute an integral part of the British industry, and have done good service in helping to establish it. Naturally the national interest calls for similar consideration.

We have suggested that all parties, certainly the main groups mentioned, should be taken into consultation, but it does not follow that complete unanimity would result. It should, however, be possible to find such a collective body of opinion in favour of one policy that the minorities could not reasonably resist its adoption. The variety of individual opinion is illustrated in the views already published. Mr. F. T. T. Reynolds, long identified with the merchant interest and a public man of experience, recognises that much may be said for and against the proposed arrangement, but thinks it undesirable to approve or condemn until details are available. The Chemical and Dyestuff Traders call for full discussion before anything is decided. Other merchants are less reserved. Mr. Singer (Singer and à Brassard) does not believe in the combine, and predicts that if it materialises merchants will have to go out of business. He pleads, too, for colour users and independent manufacturers on the assumption that they also would suffer. Mr. Sutcliffe Smith, however, who can speak with authority for the users, feels sure that in any negotiations the interests of colour users will be adequately safeguarded. Mr. J. W. Buckle, another large user of dyes, welcomes the combine as "very desirable"—"our supplies," he adds, "will be better and we shall have a larger range of dyes." Mr. A. E. Peak, of the Clayton Aniline Co., while strongly in favour of a British dyestuff industry, is against any monopoly. "Give us," he says, "the rest of our ten years of protection and we will face anything and provide all the chemists the country needs." Mr. Lionel Blundell, of the North British Chemical Co.,

administers a deserved rebuke to the partisan spirit which would discredit a great British industry in its open zeal against the B.D.C. and its thinly disguised zeal for the repeal of the Dyestuffs Act. To those who would cheerfully scrap the Dyestuffs Act and let the British industry be flooded out, he says that the loss to the nation if the dyestuffs industry failed would be "calamitous and irreparable."

These opinions disclose a wide variety, yet an agreement as to the safety of the British industry is probable between users, manufacturers, and the public interest. As regards the merchants, it seems inevitable that as we develop production at home we must import less of the class of products we manufacture. To that extent the importer is bound to suffer in favour of the producer. In this, as in other matters, we cannot have it both ways.

Reduced Fares to the B.I.F.

THE forthcoming British Industries Fair which will be held at the White City, London, from April 28 to May 9, and at the Castle Bromwich Aerodrome, Birmingham, from May 12 to 23 next, is expected to establish a record for the numbers of trade buyers visiting it from all parts of the country. By a special arrangement between the railway groups and the Department of Overseas Trade, the organisers of the Fair, visitors will be able to make the return journey from anywhere in Great Britain at a cost of one and a third of the ordinary single fare. Attached to each of the invitations issued by the Department of Overseas Trade to trade buyers will be a special slip which the visitor to the Fair can present at the railway booking office when he purchases his ticket for either London or Birmingham. On it the booking clerk will stamp the name of the station from which the visitor to the Fair is travelling. The visitor when at the Fair has then only to have the stamp of the Fair authorities affixed, and the slip at once becomes a voucher which will be accepted at the railway stations in both London and Birmingham as worth two-thirds of his return fare to the station from which he started. Such action by the railway companies is evidence of their belief in the Fair as an important factor in the creation of national wealth, and should play a considerable part in augmenting the volume of business done.

The forthcoming Fair is the tenth of an unbroken series organised by the Department of Overseas Trade, and has already engaged the attention of numerous business men who have arranged to come to this country for the opening of the Wembley Exhibition. It is exclusively a trade fair, and has come to be recognised by overseas buyers throughout the world as one of the most important events in their commercial calendar, because it brings together the displays of the principal manufacturers in practically every trade, and so enables trade buyers to do a years' buying in comfort and economy within a week. As in previous years, heavy products, such as engineering appliances and building materials, will be shown at the Fair to be held in Birmingham, the lighter commodities being displayed at the White City. The Fair promises to be no less successful than its predecessors, judging from the support it has already received from manufacturers in all industries.

Standardisation of Colliery Requisites

WE understand that, at the request of the Mining Association of Great Britain, the British Engineering Standards Association has undertaken the standardisation of colliery requisites, and that a representative committee is being set up under the chairmanship of Mr. Evan Williams, the president of the Mining Association who are contributing to the funds of the B.E.S.A. to enable this important work to be carried out on an adequate basis. Local committees are to be instituted in the various centres to study the details of the subject, and it is intended by this means to make the fullest use of the practical knowledge possessed by those in daily contact with the apparatus and equipment to be studied from the point of view of standardisation. In order, too, that concrete results may be obtained without undue delay, the committees are to concentrate their attention on a limited number of the more important questions, such as pit tubs, rails and rope sheaves, of which there are far too great a variety of types in existence.

Millions are expended annually in the replacement of various articles which go to make up the equipment of a colliery, and it is easy to see that even a small percentage saving on these will represent a sum sufficiently large to be reflected in the costs of production. It may reasonably be expected that the B.E.S.A., which has done excellent work in standardisation of steel sections and tramway rails, will do similar good work in this connection. One of the most valuable results to be looked for through the interchangeability of the standards will be quick deliveries, ease of replacements of damaged parts, and an open market for supplies. The Association, in unifying the needs of the industry —which, after all, is the fundamental significance of standardisation—will be doing much through the elimination of waste of time and material, and both the Mining Association and the B.E.S.A. are to be congratulated on the promotion of a co-operative movement which has large possibilities for the good of the coal industry and the nation at large.

Reparation Recovery

THE German Reparation Recovery Act, as our readers will remember, authorises the purchaser of German goods to tender 74 per cent. of the price to the German exporter, retaining 26 per cent. for the British Treasury. A receipt for this amount, forwarded to the German exporter, was to be his authority for drawing a like amount from the German Government. The conflicts which have arisen between the German Government and the Allies in connection with Reparations, however, have caused the former to decline further reimbursement. This, of course, means either that the German exporter voluntarily reduces his price 26 per cent. or that the whole charge is made on the British consumer. A delegate from the German Government is understood to be in this country endeavouring to arrange the matter with our own authorities.

In the meantime (a Parliamentary correspondent writes) a more complicated situation arises in connection with those German goods which are liable to McKenna duties. The duty, of course, is added to the value of the goods for the purpose of calculating

the 26 per cent., and, unless the German Government undertake reimbursement, a total tax of over 80 per cent. is laid on the British importer. The matter is one which will no doubt be raised when the new Government calls the House together in the middle of February. Should it be decided that action must be taken, two courses are open to the authorities. The first is to reduce by Treasury Order the amount of the Reparation duty. This was originally fixed at 50 per cent. and reduced to 26 per cent. by such an administrative Order. It could, of course, if it were thought well, be further reduced to a nominal amount. A second course of action is open, namely, to suspend by resolution of both Houses the operation of the Act. This course has been suggested in every Parliament since the Act was passed but the motion has always been defeated on the grounds that the Act gave a substantial yield to the Treasury. The question is—who pays this sum? and on that very differing opinions are held.

The Liverpool Conference

IN July, for the fifth time in its history, the Society of Chemical Industry will visit Liverpool for its annual meeting. It is over ten years since the Society last met there, the previous occasions being 1886, 1893, 1902, and 1913. At a preliminary meeting this week, presided over by the Lord Mayor, there appeared to be every desire to make the meeting a signal success. Liverpool is the natural centre of some of the greatest chemical organisations in the world; it has within or just over its borders some of the most notable personalities in the British chemical industry, and this year's president (Dr. Armstrong) has the advantage of close personal associations with the district. An executive committee has already been appointed, and the proceedings will now go forward in the usual way. For the study of applied chemistry, Liverpool is a particularly suitable centre, and visits to works will be sure to constitute a prominent feature in the programme.

The Strikers and the Stricken

THE railway strike ended on Tuesday after a run of nine days. The very limited number of locomotive drivers in whose interest it was supposed to be organised lost more in that period than they are likely to regain for some time. A considerable number of workers in other trades have suffered owing to the holding up of essential supplies. The public, including the working classes themselves, have been put to serious loss and inconvenience. Tradespeople and others have suffered heavily in custom, and the industry of the country as a whole has had another set-back. Nobody has gained anything that really mattered; everybody has lost and will have to bear their proportion of the penalty. Mr. Bromley may possibly be pleased with the result, but in this respect he stands alone in his glory. The public sentiment and the public is always with the workers when they suffer from substantial grievances, but the country has no use for pedantic disputes of this order, which leave every class the poorer and adds to the heavy handicaps against which British industry was already struggling.

Points from Our News Pages

The hearing of the Mustard Gas Production Claim was continued on Monday, and brought out a number of new points (p. 112).

Dr. E. K. Rideal delivered the Second Cantor Lecture on "Colloid Chemistry" before the Royal Society of Arts, on Monday (p. 115).

According to our London Market Report business during the past week has shown a decided improvement (p. 124).

The week has brought a fair number of inquiries, although business has been uncertain owing to the railway strike, states our Scottish Market Report (p. 127).

Our Metallurgical Section contains an article on "Refractory Materials for Steelworks," Metallurgical Topics of the Month, Notes on New Inventions, and a monthly Trade and Financial Letter.

Books Received

COLBAT ORES. By Edward Halse. London: John Murray. Pp. 54. 3s. 6d.

INDUSTRIAL HYGIENE AND MEDICINE. By E. W. Hope, W. Hanna, and C. O. Stallybrass. London: Bailliere, Tindall and Cox. Pp. 766. 25s.

The Calendar

Feb.		
4	Society of Chemical Industry (London Section) Joint Meeting with the Chemical Engineering Group: "The Manufacture of Potash and Other Salts from Leucite." Professor J. W. Hinchley. 8 p.m.	The Engineers' Club, London, W.1.
4	Institution of Rubber Industry (London Section): "Rubber Latex." F. Kaye. 8 p.m.	Engineers' Club, Coventry Street, London, W.
4	Royal Society of Arts: Cantor Lecture—III. "Colloid Chemistry." Dr. E. K. Rideal. 8 p.m.	John Street, Adelphi, London, W.C.2.
4	Institute of Chemistry (Manchester Section): Annual Social Meeting. 7 p.m.	The Grand Hotel, Aytoun Street, Manchester.
4	University of Birmingham Chemical Society: "Glass and Its Chemical Nature." D. G. Skinner.	The University, Birmingham.
5	Society of Chemical Industry (Birmingham and Midland Section): "Some Studies in the Kinetics of Oil Hydrogeneration." E. J. Lush. 7.15 p.m.	The University, Birmingham.
5	Society of Chemical Industry (Edinburgh and East of Scotland Section): Annual Dinner with the Edinburgh and East of Scotland Section of the Institute of Chemistry.	
5	Hull Chemical and Engineering Society. "Kinematograph Exhibition of Living Micro-Organisms." Explanations by A. R. Tankard. 7.45 p.m.	Hull Photographic Society's Rooms, Grey Street, Park Street, Hull.
6	Society of Public Analysts: Annual General Meeting. 8 p.m.	Burlington House, Piccadilly, London, W.1.
6	Institute of Physics: Public Lecture—"The Physicist in Metallurgy." Professor C. H. Desch. 5.30 p.m.	Burlington House, Piccadilly, London.
7	Chemical Society: Ordinary Scientific Meeting. 8 p.m.	Burlington House, Piccadilly, W.1.
7	Royal Institution of Great Britain: "Crystalline Structure of Organic Substances" (Lecture 1). Sir William Bragg. 5.15 p.m.	21, Albemarle Street, London, W.1.
7	Society of Chemical Industry (Bristol Section): "Current Chemical Research at Bristol University." Professor F. Francis and Professor J. W. McBain. 7.30 p.m.	The University, Bristol.
8	Public Lecture: "Food and Why We Require It." Dr. J. A. Hewitt. 5.30 p.m.	University of London, King's College, Strand, W.C.2.
8	Society of Chemical Industry (Cardiff Section): Discussion on the action of Acids on Metals, to be opened by H. W. Webb. 7.30 p.m.	Technical College, Cathays Park, Cardiff.

Chemists' Claim for Mustard Gas Production

Cross-examination of Sir William Pope: Evidence on French Production

MONDAY was the fifth day of the hearing of the claim of Dr. Levinstein and Professor Green in the Chancery Court as to the production of mustard gas, before the War Inventions Commission, presided over by Mr. Justice Tomlin, assisted by Mr. A. Chaston Chapman and Mr. Norton, K.C.

The proceedings consisted of the examination of Slr W. Pope, Professor Gibson and other witnesses for the Crown, in connection with the contention that the production of mustard gas was primarily due to the work of Professor Pope, and the opening of the evidence by Dr. Wilbraham in connection with the Crown's contention that the points in the claimants' process were first used in France.

A General Impression

The sitting was from the spectators' point of view the most interesting of the series. Distinguished as he is for a rare patience and unfailing courtesy, never fussing counsel or witnesses and only intervening to elucidate some doubtful point, Mr. Justice Tomlin intimated immediately the Court opened his sense of the protracted character of the proceedings, making a rather pointed comment on the figure the Crown costs must be running to, and reminding all concerned that the issue was not one of personal kudos. Mr. Hunter Gray seemed obviously impressed, and during luncheon some consultation took place between the parties. Any expectations that this might possibly lead to a settlement were disappointed, however, Mr. Gray merely stating that he would take the remaining witnesses as shortly as possible, and promising to finish his case at the next sitting.

The first question Sir Duncan Kerley put to Sir William Pope, in his grimly incisive style, clearly disclosed the line he intended to follow. When, if at all, did the professor determine the reaction for a works process to produce mustard gas with sulphur in solution? Sir William's reply was that he had nothing to do with the works process, and later Professor Gibson took the same line. Sir Duncan's questions did not challenge any chemical formula or laboratory process; the case they indicated was that while the chemical experts were considering the problem of separating the sulphur out the Levinstein process showed a practical way of producing mustard gas with the sulphur left in solution and so got rid of the sulphur deposit trouble altogether. There was one almost dramatic moment in Sir William's cross-examination. Sir Duncan Kerley read lengthy extracts from published letters written in an official journal by Sir William Pope. These as read sounded like tributes to the Levinstein process, Sir William explained that they were intended to be sarcastic.

On the question as to who first worked on the basis of leaving the sulphur in solution Dr. Wilbraham gave some interesting evidence. He described what he saw of this process in France and how it was adopted at Avonmouth. Dr. Wilbraham, contrasted with some of the scientific witnesses, who were inclined to argue in terms the judge frankly confessed he could not understand, made a perfect witness, just answering directly the questions put to him, and stating facts clearly and in an entirely impersonal spirit.

Next Monday it is expected the Crown case will be concluded, and it seems almost certain that judgment will be reserved.

The Length of the Case

Immediately on the opening of the proceedings, Mr. Justice Tomlin said that there had already been four meetings in connection with this case, and the present was the fifth. For the moment he could not quite see the end of the lane, and it had occurred to him that assuming the maximum success for the claimants, the cost of fighting the claim was becoming out of all proportion to the value of it. He could not help thinking that the case was developing into a contest between inventors which, in one sense, the Commission had nothing to do with. The Commission was only concerned with the particular claim, and to be in such a position as to justify an award in the terms of the Royal Warrant. If, in determining that, the cost became out of all proportion to the claim, it made one uneasy. It did not seem to be the function of the Commission to occupy their time in determining matters, should he say, of kudos, and he would rather like Counsel to bear this in mind before many more days of this controversy were entered upon.

Mr. J. Hunter Gray, K.C., for the Crown, said he respectfully sympathised with what his Lordship had said, and the point had impressed him very much that the case should have occupied so much time. Nevertheless, there was one aspect which made this case peculiar, and that was that it appeared difficult to deal with the claim without going into the question of priority of invention. It appeared to him unavoidable that the Commission must determine that question.

Mr. Justice Tomlin said that no doubt from Mr. Hunter Gray's point of view, as representing the Crown, it was a difficult one, and their point of view was different from Sir William Pope's point of view. At the same time they seemed to be getting into country where it was a matter of Sir William Pope's point of view which was the opposing point of view to that of the claimants, and he was not clear that that was the right point of view to deal with the case so far as the applicants were concerned.

Mr. J. Hunter Gray replied that he had endeavoured not to make this Sir William Pope's point of view. Then there was the other aspect that hitherto no specific amount had been mentioned as being claimed by the applicants. The case had been opened, and evidence had been given, on a basis which might make the amount a very serious one, but so far there was no indication of what the claimants were asking for.

Mr. Justice Tomlin said he had a pretty clear idea that if it were put at its highest in £ s. d. it would be something relatively small.

Mr. J. Hunter Gray: If that is so it is a different thing.

Mr. Justice Tomlin: It seems to me very much as if the real thing at the bottom of it all is not £ s. d., but kudos, and I do not think that this Commission has got to try the question of kudos.

Mr. J. Hunter Gray said he respectfully agreed, but he still understood that there was a substantial claim being made in respect of an award.

Mr. Justice Tomlin said it all depended upon the meaning of the word "substantial." What was concerning him was that as the case was panning out, it did not seem to him that the claim could amount to anything like the costs of the Crown the way things were going. "I am thinking of the country, and not of the individual," he added.

Mr. J. Hunter Gray said that on behalf of the Crown he had to put forward every point of view upon which he could get evidence.

Mr. Justice Tomlin: I appreciate your position is a difficult one, but I thought it right to tell you what is in our minds.

Mr. J. Hunter Gray: I am much obliged. I assure your Lordship's colleagues that I usually keep my cases as short as I can. We will bear what you have said in mind.

Sir Duncan Kerley: Do not beat me with my friend's stick, my Lord. I have not made the case last long.

Mr. Justice Tomlin: I am beating no one with a stick, only the air. (Laughter.)

Sir Duncan Kerley: Perhaps when I have had half an hour with Sir William Pope the case will take a turn in the direction you have indicated.

Mr. J. Hunter Gray: My friend is very optimistic.

The Value of Skin Tests

Before continuing Professor Pope's evidence from the previous hearing, that of Professor Dixon, professor of pharmacology at Cambridge, was interpolated. This was to the effect that skin tests of mustard gas were so variable as to be useless quantitatively. In his opinion, $\frac{1}{500}$ of a drop placed on the tongue would cause septic conditions resulting in death. The ultimate effect as distinct from the immediate, was dependent on the amount of ββ dichlorethyl sulphide, and mustard gas was used in warfare for its ultimate effect in rendering dumps or trenches uninhabitable.

In cross-examination by Sir Duncan Kerley, Professor Dixon said he had not heard that Dr. Meyers once accidentally smoked a cigarette which had been dropped into mustard gas without serious results. In his opinion the skin tests made

by Major Raper in 1918 were valueless; he did not know that Major Raper still believed them to be accurate quantitatively to within 5 per cent.

Sir William Pope's Evidence Continued

In continuing his evidence, Sir William Pope described some experiments he had carried out in imitation of Professor Green's, in an iron pot, and as a result of which he had obtained 29 per cent. of the yield as crystalline ββ dichlorethyl sulphide by freezing it out. Working in the iron pot produced some innocuous trisulphide, this accounting largely for the non-separation of the sulphur. The mono-sulphide could not have been obtained from the disulphide by cooling.

This concluded his examination-in-chief.

Sir William Pope Cross-examined

Sir Duncan Kerley, beginning his cross-examination of Sir William Pope, asked: When first, if at all, did you determine the proper reaction for a works process to be directed to a product in which sulphur remained in solution in a clear liquid?

Sir William Pope: That is a question which can hardly be put to me in that form. I was not concerned in works practice.

Sir Duncan Kerley: Is your position, then, that you never so determined——?

Sir William: Will you put the question again?

When did you first determine that the proper reactions to choose for a works process were those directed to getting a clear liquid with sulphur in solution?—On February 1, 1918.

I am going to suggest to you that the experiment was an isolated thing to which no attention was paid. Do you still tell the Commission that on the 1st February you had determined that the thing to go for was a clear liquid with the sulphur in solution?—I never determined anything from the point of view of works practice.

Did you ever advise the persons concerned in the manufacture or directing the manufacture that they should go for a clear liquid with sulphur in solution?—Certainly not, sir; that was not my business.

Do you know that Chance and Hunt, who had an experimental plant, were never told that a clear liquid could be obtained?—I do not.

When first, if at all, did you determine that the purity of the ethylene from alcohol and ether was an essential condition of getting a clear liquid?—That question was not determined by myself or anyone else until after the Armistice.

Sir Duncan Kerley then called attention to an article by Sir William Pope in the Journal of the Society of Chemical Industry for September 30, 1919, in which it was stated that the method described in the Patent Specification had been first adopted by Messrs. Levinstein and that this firm was producing within six weeks from the time it undertook a large scale installation.

Sir William Pope agreed that that was true, subject to the modification that he had overlooked the fact that Messrs. Chance and Hunt had previously made considerable amounts.

Counsel then put it that the method as Sir William Pope had left it in the laboratory involved working in the absence of iron, but that it did not involve the use of pure ethylene.

Sir William Pope replied that it involved ethylene of a purity at least as great, if not greater, than that used by Messrs. Levinstein.

Mr. Justice Tomlin: I do not think that is an answer to the question.

Sir Duncan Kerley pointed out that on May 29 Sir William Pope had written to the directors of Messrs. Levinstein pointing out that the purity of the ethylene was not important.

Sir William Pope: But Messrs. Levinsteins' ideas of purity and mine are different.

Mr. Justice Tomlin: We are not concerned with that.

Sir Duncan Kerley, quoting further from the article already referred to in the Journal of the Society of Chemical Industry for September 30, 1919, added that Sir William Pope said that Levinsteins had converted a laboratory process into a successful works process, and had performed absorptions at between 30° and 40° in order to retain the liberated sulphur in some sort of pseudo-solution. In face of that statement, continued Sir Duncan, do you tell the Commission that the idea of retaining the sulphur in solution was not invented by Messrs. Levinstein?

Sir William Pope: Certainly. Messrs. Levinstein did not invent that.

Sir Duncan Kerley reminded Sir William Pope that in his evidence-in-chief he had stated that he did not tell Professor Green anything about keeping the sulphur in solution.

Sir Duncan Kerley read further extracts, and concluded by quoting a statement with regard to the Levinstein reactor used in the process, that the inventive genius exhibited in the design of this apparatus was in keeping with the great traditions of the British Dye Industry, and that it was a most valuable adjunct to the resources of the technical chemist.

Sir William Pope: That is intended to be sarcastic.

Sir Duncan Kerley looked up in surprise at this answer, and there was some laughter.

Iron Vessels Spoiling Product

Pursuing the point as to the date when Sir William Pope first knew that the sulphur could be kept in solution, Sir Duncan Kerley again received the answer that it was on February 1, 1918.

Sir Duncan Kerley: Apart from the fact that in one odd experiment you got the sulphur in solution, did you know anything about the conditions which would enable you to keep the sulphur in?

Sir William Pope: No, nor did your clients.

Sir Duncan Kerley: Kindly confine yourself to answering the questions. Was it not a surprise to you to find that Messrs. Levinstein could make a product with the sulphur in solution?—Most certainly not.

In answer to further questions Sir William Pope said that by using iron vessels Messrs. Levinstein were spoiling the product, although he did not know it at the time.

Counsel next quoted a letter by Sir William Pope dated May 29, in which he said that it was of the utmost importance that the sulphur should not remain in solution because otherwise one could never be sure that it would not come out at some awkward moment. It was then put to Sir William Pope why, if he had ascertained on February 1, 1918, the possibility of getting a clear solution with the sulphur in solution, he did not set to work to ascertain the conditions, which were now said to be very important, for keeping the sulphur in.

Sir William Pope said that this letter was written at a time when very little was known about the matter.

Sir Duncan Kerley then referred to the fact that the importance of having the ethylene free from alcohol vapour had not been brought to the notice of Mr. Quinan, the chemical engineer in charge at Avonmouth, by Sir William Pope, the Government chemist advising on this matter, for the simple reason that he had not done the experiment, and he suggested that looking back, Sir William was entirely mistaken as to what his mental position was at that time—*i.e.*, 1918.

Sir William Pope said his mental position at that time was the same as it is to-day. He was not concerned with the works process, but solely with the reaction which he described in the patent specification, and in which there was a reference to keeping the sulphur in solution.

Sir Duncan Kerley: Do you still say that the necessity for keeping the ethylene free from alcohol if you want a clear liquid was only discovered after the Armistice?—Yes.

Your freak experiment of February 1 did not show that you had got a desirable product?—I say it did. All these products were desirable, but it was for others to decide which particular one should be used.

Do you suggest that the result of your experiment of February 1 was that you found you had a product with sulphur in that was likely to be useful in warfare?—The answer is "Yes" to the first part of the question, but the second part was no business of mine.

Have you any report to show that that was a useful product to go for?—No.

Mr. Justice Tomlin: Suppose you were invited to assist the Government in getting some product required in very large quantities, would you regard it as the end of your functions if you were able to produce a sample of that product in the laboratory, and that it would be no part of your functions to consider the conditions of mass production of it?

Sir William Pope: That is essentially true. I was the pure scientific person engaged in working out the reaction.

Mr. Justice Tomlin: May I put it, not offensively, of course,

that it was a matter of indifference to you whether it was capable of mass production as long as you yourself could produce the product or show that it could be produced.

Sir William Pope: That is so.

Mr. Justice Tomlin: Your position was this: "There is the product which I can produce in my laboratory. Whether you can produce it in your factories has nothing to do with me"?

Sir William Pope: That was the business of others. The limit of my functions was the working out of the chemical reaction by which this stuff could be prepared.

Sir Duncan Kerley: Had you any idea whether the liquid you got on February 1 was toxic in character?—Certainly. Its toxic character was measured by the amount of mustard gas distilled from it.

Asked as to whether, when he went to Levinstein's works on May 22, 1918, and took away a sample of their mustard gas he did so because he thought it was something new, Sir William said he took it away for examination, and it was sent to Colonel Harrison for report. He did not regard it as a material which he knew nothing about, but, on the contrary, a material which he knew all about. It was an application of his own method, which in his opinion would give bad results, and that proved ultimately to be the case. The particular sample was sent to Colonel Harrison in order that it should be subjected to physiological tests.

Sir Duncan Kerley: Did you believe it was useless?—No, I believed its usefulness was proportional to its percentage of mustard gas; 50 per cent. as a matter of fact.

Questions were then put by Sir Duncan Kerley that the Levinstein product had complied with the Government specification of 70 per cent. pure monosulphide. Sir William Pope said he had not made analyses personally, but he had seen results which varied between 47 and 75 per cent.

Analysis of the Levinstein Product

Mr. J. A. Wilkinson was then called. He stated that he had prepared the table produced in Court from analyses of Levinstein's product, carried out under his supervision at Woolwich Arsenal. The distillation was carried out according to the specification. The results showed that the Levinstein product contained from 47 to 70 per cent. of H. H, he explained, was ββ dichlorethyl sulphide, the impure product with sulphur being known as HS. It was asked by Mr. Moritz, for the claimants, whether these figures referred to the HS as taken from the tanks, and a reply was received in the affirmative. It was pointed out by Mr. Moritz that there was 10 to 15 per cent. of diluent added to the HS in order to make it up to a definite specific gravity.

Professor Gibson's Experiments

Professor C. S. Gibson, who was Sir William Pope's assistant in 1918, and now head of the chemical department at Guy's Hospital, London, next gave evidence. He said he had no part in designing the plant, but he had carried out a number of experiments with Sir William. The experiment on February 1 was the first to show a clear liquid product. The object of the experiments was to produce ββ dichlorethyl sulphide by an improvement on the German method.

At this point the Court adjourned for luncheon, and on resuming the hearing Mr. Gray announced that though he hoped to shorten the case if possible he was proceeding on the original lines.

Professor Gibson, continuing his evidence, stated that he had had nothing to do with the works process, but he had visited Blackley in May, 1918, to help Professor Green. He had certainly not gone to get information. During his visit his laboratory note-book had remained on the bench in Professor Green's laboratory. He could not say whether anyone had seen the record of the experiment of February 1. Mr. Peachey, Professor Green's assistant, had written a few notes in the book. He stated that nothing was discovered during that week, but the use of the iron pot was new. Stirring, he thought, was less rapid than at Cambridge.

Professor Gibson paid a second visit to Blackley in August, when he was in the neighbourhood on holiday.

In cross-examination by Sir Duncan Kerley, Professor Gibson explained that he had taken a sample of the Levinstein product from Blackley, and submitted it for examination because that was the usual procedure.

Sir Duncan Kerley: On your first visit to Blackley did you show them your experiment of February 1?—I can't say. Don't you know that you did not?—I cannot say.

Professor Gibson explained that he had told Professor Green he could get any information he liked.

Sir Duncan Kerley read a letter from Professor Gibson stating that the Levinstein product was a most useful and interesting one, and considerably simpler to manufacture, and asked whether this did not refer to a product with sulphur in solution or combination.

Professor Gibson replied he thought it did.

Dr. Wilbraham's Evidence

Dr. Evelyn Wilbraham was then called. He stated that he was superintendent at H.M. Factory at Rainham from 1914 to 1918. He was Liason Officer to the Gas Charging Department in 1918. In June, 1918, he knew Levinstein's were working on mustard gas, but he knew no details. Dr. Howard and Mr. T. Smith, of Castner-Kellner's, had worked on a small factory scale in an iron vessel about that time.

He had visited the French works at Pont de Claix on June 7, and found they were producing mustard gas and filling shells with it. They worked at 40°, and the sulphur was not precipitated in solid form. The sulphur-removing apparatus originally installed there was abandoned. Sometimes they had a little difficulty with separation of sulphur in a liquid form. Other French works were also producing mustard gas, at least one of these by the low-temperature process.

There was a conference, to which Major Froissart, a French officer, came to consider the problems of production at Avonmouth. It was recommended that a temperature of 40° be used, and ethylene bubbled in under pressure. In the large scale plant there were to be agitators. He believed these recommendations were adopted with only slight alterations, such as lowering the temperature down to 35° C. Copies of the report were sent to Levinstein's on the 2nd or 3rd of July.

On July 6 he visited Blackley to make a report. He found only the regulation of ethylene and a few other details were new. He had referred in the report to Professor Green as responsible for the discovery that sulphur could be kept in solution.

Trouble at the French Works

In cross-examination by Mr. Moritz, Dr. Wilbraham said that he did not know that there was constant trouble and heavy casualties at Pont de Claix. He was not aware that the men employed there received first-line pay and decorations because of the danger, nor that the French Government ultimately got German prisoners to do the work. He had had a visit from Dr. Levinstein on June 17, but he did not remember being told anything of importance; if he had he would have made a report.

Mr. Justice Tomlin: Was it your practice to make a report on any information you received?

Dr. Wilbraham: Invariably.

Mr. Moritz produced a letter from Dr. Levinstein to Mr. Quinan, in which he said, "On the 17th June I gave Wilbraham all the details I could remember." Dr. Wilbraham explained that although it was difficult to remember what had happened six years ago, he knew he had made no report, which he would certainly have done if he had heard anything of importance from Dr. Levinstein.

The hearing was adjourned.

Death of Mr. A. C. Flint

We regret to announce the death on Thursday, January 24, of Mr. A. C. Flint, after an operation for appendicitis. He was assistant secretary to the Chemical Engineering Group almost since its inception, and acted in a similar capacity to the Institution of Chemical Engineers, and carried through the clerical work during its establishment. The loss to these bodies is very great, for Mr. Flint endeared himself to everyone by his modest and retiring disposition, his sterling character, and his untiring energy in his work. He was a member of the "Radium" Lodge, (No. 4031) of Freemasons, and was very active in its Lodge of Instruction.

The interment took place at Islington Cemetery, East Finchley, on Monday, when representatives of the Chemical Engineering Group, Institution of Chemical Engineers, and his Masonic brethren paid their tributes of respect to his memory, gratitude for his services, and sorrow at his loss.

The Chemistry of Colloids

Second Cantor Lecture by Dr. Rideal.

DR. E. K. RIDEAL delivered the second of his series of Cantor lectures on Colloid Chemistry at the Royal Society of Arts, John Street, Adelphi, London, on Monday.

After a brief review of the ground covered in his first lecture, he went on to deal with suspension colloids, in which a solid phase was finely dispersed, either in a liquid or gaseous dispersion medium, forming sols and smokes respectively. A solid disperse phase might be prepared in two ways, either by growth from molecules in solution or by dispersion of a bulky solid. In industry, both these methods were adopted for preparing colloidal sols.

The first method by which we could prepare a solution of a solid disperse system in a liquid was by condensation. In the case of a solution of salt which was relatively supersaturated, for a crystal to start growing, it was necessary for a nucleus to be present. Once a nucleus was formed, it grew by the diffusion of the molecules to the various minute crystal faces. The various crystal faces might possess different surface energies, and thus those faces which possessed the smallest interfacial surface would be most stable. If conditions were favourable to very rapid growth, however, not only would there be faces with higher surface energies, but the molecules might become attached to the surface in positions not in the regular crystalline space lattice, and we built up a partly regular and a partly irregular molecular structure. Such a particle would possess a high superficial surface energy, which, on warming the crystal, would gradually decrease, since the thermal oscillations of the attached molecules, when sufficiently vigorous, would permit of their entering their proper position in the crystalline space lattice. Such an operation, known as "sintering," was frequently made use of in the baking of materials such as were employed for brick and pottery manufacture, and in the production of solid metals from powders, as in the case of tungsten filaments.

A sol consisted of a highly dispersed solid; thus, in order to prevent the growth of a relatively few large crystals it was evidently necessary to ensure the simultaneous formation of a large number of nuclei, which must grow extremely rapidly. These principles had been developed in detail by von Weiman, who had shown that we might obtain materials in either the crystalline or colloidal state by alteration of what was termed the dispersion coefficient; the dispersion coefficient δ being defined by the equation :—$\delta = c/s$ where c was the degree of supersaturation or equivalent concentration in the solution, and s the solubility. A high dispersion coefficient ensured the formation of a small grain or potential colloid. Dr. Rideal showed some experiments demonstrating that the same substance could be obtained slowly in a crystalline form by precipitation from solutions of low concentration, or rapidly as a colloid from solutions of higher concentration.

Preparation by Dispersion

Discussing methods of dispersion, the lecturer said that mechanical dispersion could be accomplished by the process of heating, hammering and trituration, or in the electrical arc. Such methods of mechanical dispersion, however, did not in themselves lead to the formation of stable sols, a point which was of great importance, not only in the technical but in the theoretical development of colloidal chemistry. The observations of many investigators had shown that the small particles of the solids were in continuous agitation, moving across the field of a powerful microscope, or as a point of light in the ultramicroscope, in a curious, tremulous, zig-zag fashion. Such motion, investigated by Robert Brown, was known as the Brownian agitation; the Brownian agitation was shown to be one of molecular bombardment, and we were, in fact, observing the movements of particularly large molecules under the impacts constituting the molecular thermal agitation.

Conditions for Stability

We should expect that chance collisions between particles would occur with some frequency, and that under the influence of the surface forces coalescence would occur, and the sol would rapidly flocculate. In general, however, this was not the case; sols were frequently extremely stable, and might be preserved for a number of years. For instance, Faraday's original colloidal gold could still be observed in the laboratory at the Royal Institution. The two important factors making for stability of sols were the electric charge and the interfacial surface tension.

Colloidal sols, to be stable, must possess an electric charge. Certain sols, such as colloidal metals, colloidal sulphides, gums and oils possessed in general a negative charge, whilst hydroxides and oxides of the metals, and many dyes, were positively charged. The production of an electric charge on a colloidal particle might have two different results. If an electrolyte be present in the dispersion medium it would be adsorbed at the interface. Evidently this adsorption produced an interfacial electrification, with the result that ions of opposite sign were held to the outside of the electrified surface, producing an electrical double-layer. Again, many colloidal sols acquired an electric charge by surface ionisation: thus, in the formation of colloidal ferric hydroxide from ferric chloride by a process of dialysis, we had every reason to believe that the particle of the sol was constituted of ferric hydroxide containing a small quantity of ferric chloride, which on dispersion in water underwent partial ionisation, the particle thus acquiring a positive charge.

Protection of Colloids

The stabilising of small particles by lowering the interfacial surface tension between the particle and the dispersion medium could be accomplished by adding to the solution some material which was more strongly absorbed by the surface than the dispersion medium. Zoigmuntz had noted that gelatine, soaps, gums, hæmoglobin, etc., functioned as protecting agents—*i.e.*, increased the stability of the particle by such preferential adsorption.

The stabilisation of colloids by the addition of protective colloids had received extended application. Colloidal platinum employed for catalytic hydrogenation was always protected by means of gum arabic or cysalbic acid, whilst the colloidal metals and other sols employed for therapeutic purposes must be protected from precipitation of the salts present in the blood. Evidently, the factors to be considered in the preparation of such substances were enhancement of stability against precipitation, with suitable adjustment of their toxic action.

The existence of an electrokinetic potential between a particle and the dispersion medium gave rise to the phenomenon of electric cataphoresis and electric endosmose. If a couple of electrodes be placed in a colloidal solution, and a difference of potential be applied, the particles, if positively charged, would wander to the cathode, and the mobility of the particle could readily be calculated, with the aid of Stokes' law. Practical application of electric endosmose was to be found in the drying or de-watering of colloidal materials such as peats and clays, and in the removal of sugar from beet. The rate at which we could dry peat or de-water clay could be materially altered by getting a very high charge on the peat or clay by the addition of suitable electrolytes, but if too much electrolyte were added we could actually get to the point at which no de-watering would take place. The phenomenon of electric endosmose and cataphoresis could be attributed entirely to the fact that the particles of the disperse phase were charged.

Another example of the technical application of protection was to be found in the recent development of colloidal fuels. These fuels consisted essentially of a stable suspension of coal in a hydrocarbon oil. Although the oil solid inferfacial tension might be relatively high, yet, owing to the high viscosity of the oil dispersion medium, the suspension might appear relatively stable. When storage was contemplated, however, it was necessary to add a fixateur, which was, in fact, a protective colloid. Protective agents might also be regarded from a different point of view. It was evident that they were preferentially absorbed, and it was on this property of preferential wetting of solids that the practice of ore flotation was based.

Smokes were electrically charged, and could be caused to exhibit electric cataphoresis under the influence of a potential gradient, which formed the basis of the Lodge and Cottrell methods of removing industrially valuable products, such as potassium salts, from the gases of cement kilns, the treatment of metallurgical smokes from smelter works, the cleaning of blast furnace gas in the manufacture of lamp black, and so on.

The lecturer concluded with some reference to the effect of particle size on the scattering of light and the apparent colour produced.

Preparation of Fused Silica

Notes on the Discovery of Practical Methods

A LECTURE on "The History, Development and Commercial Uses of Fused Silica," was given at the Royal Society of Arts, London, by Sir R. A. Surtees Paget, on Wednesday. Among the historical points mentioned was the fact that the first artificial fusion for silica was performed in 1839 by Gaudin, of Paris, who communicated to the Academy of Science his experiments on quartzite fusion. Gaudin used the oxy-hydrogen blowpipe; he found (1) that fused quartz never became truly fluid; (2) that it began to volatise near its melting point; (3) that on cooling it became a transparent glassy mass; (4) that in this condition the material was unaffected by sudden changes of temperature, and showed remarkable strength and elasticity; (5) that on prolonged heating the vitreous quartz returned to the crystalline condition—*i.e.*, it became devitrified, and lost its mechanical strength. In 1888 Sir Charles Parsons communicated to the Royal Society a series of experiments, including that of fusing silica sand by means of an electrically heated carbon rod embedded in the sand—the fusion being carried out inside a closed cylinder and under a pressure of five to thirty tons per square inch. In 1898 Vernon Boys devised a beautiful method of drawing very fine quartz threads by means of a miniature crossbow and arrow.

In 1901 Shenstone demonstrated at the Royal Institution his method of building up fused silica tubes by drawing pieces of rock crystal out into thin rods in the O-H blowpipe, assembling these faggot-wise round a platinum core and then fusing them together in the blowpipe. This method was developed commercially by Messrs. John and Matthey, their organisation being known as the Silica Syndicate. This company made notable improvements in the manufacture of transparent fusions. Kent's method of building up a bubble free fusion consisted in feeding rock crystal powder into the heated zone. The mass thus formed was subsequently worked in the O-H blowpipe.

Production of Opaque Silica

Following upon experiments started in 1903 by Lord Rayleigh and others, it was found possible to fuse sand, the process being afterwards taken up by the Thermal Syndicate. The furnace consisted of a melted trough full of sand with a heating core fixed axially within it. Owing to overheating, the fusion became inflated by gas evolved due to the reaction between the silica and the heated carbon rod, and a hollow fusion like an ostrich egg was produced. It soon became clear that by carefully regulating the temperature it was possible not merely to bring the whole fusion to a state of substantially uniform plasticity, but also so to regulate the interior gaseous pressure (due to CO and silica vapour formation) that the fusion remained separated from the core except at its relatively cool extremities. Under these conditions there was no further reaction between silica and carbon, and the fusion could be blown up *in situ* into moulds surrounding the fusion, or the core could be withdrawn altogether from the fusion and the fusion itself removed from the furnace. The fused mass—in the form of a large tubular sausage—was found to retain its plasticity for a considerable time, due to the heat insulating effects of the unfused sand which adhered to the fusion. In consequence of this, the fusion could be drawn into tubes or blown out into moulds or pressed or rolled without reheating. The material produced by drawing, blowing, or pressing a sausage of fused silica sand contained bubbles drawn or spread out into threads or laminations, so that the material had a grain.

The first outstanding property of fused silica—whether transparent or opaque—was its low co-efficient of expansion. Fused silica was in a class by itself—its expansion being less than ⅛ of that of the best glass of the Pyrex type, and less than 1/20 of that of the high expansion glasses. This property enabled it to withstand sudden changes of temperature without fracture.

The lecturer gave a number of demonstrations of this property, which had many commercial applications. Among other valuable properties was its insolubility in water or acids adapting it to chemical apparatus for delicate analysis. Among its disadvantages were the facts that it lost weight by vapourisation below its fusing point, and its imperviousness to gases disappeared at comparatively low temperatures, 300° C. in the case of hydrogen.

Growth of Canadian Chemical Industry

As is fairly well known in Great Britain one of the minor effects of the great war was an immense expansion in the chemical industries of the Dominion of Canada, and particularly in those branches of the industry benefiting from the possession of cheap hydro-electric energy. Since 1920, however, the experience of those firms having a large export trade has been one of slow and reluctant deflation. In some divisions of the industry the period of deflation has been successfully passed through and there is little doubt that a slow, gradual improvement and growth took place in the course of the past twelve months. Canadian firms have benefited recently considerably in the export of electric furnace and electro-chemical products to Great Britain by reason of the Safeguarding of Industries Act.

Probably only a very limited number of the chemical products utilised as raw materials in Canadian chemical plants are actually of Canadian production, and the number of products made in quantities over and above domestic requirements are very few and consist largely of those in which hydro-electric power is one of the principal items of cost. These include aluminium and its products, cyanamide, cyanide, calcium carbide, artificial abrasives and acetic acid. Practically the only other branch of the industry in which any large export trade is carried on is that connected with the processes of wood distillation, which industry, however, since 1920 and 1921 has been in none too flourishing a condition.

In three other branches of the Canadian chemical industry the domestic output largely meets the home demand. These are as follows: explosives, the paint industry, heavy chemicals, such as sulphuric acid, soda ash, etc.

The major number of the other chemical products utilised, about eighty per cent. of the total, are supplied by importation, mainly from the United States.

The following figures will summarise the situation as regards the total volume of the industry in Canada and external trade:—

TOTAL PRODUCTION OF CHEMICALS IN CANADA

Year.	No. of Plants.	Capital.	Employees.	Selling Value.
1919 ..	430	$116,000,000	16,100	$103,000,000
1920 ..	457	123,000,000	17,700	128,000,000
1921 ..	459	121,000,000	13,000	90,000,000
1922 ..	470	123,000,000	15,000	101,000,000
1923 ..	Estimated 5 per cent. to 10 per cent. improvement over 1922 figures.			

EXPORTS OF CHEMICAL AND ALLIED PRODUCTS FROM CANADA

Year.	Value in Dollars.
1914	6,000,000
1917	58,422,000
1918	56,718,000
1919	63,512,000
1920	29,481,000
1921	26,300,000
1922	11,360,000
1923	18,646,900

CANADIAN IMPORTS OF CHEMICALS AND ALLIED PRODUCTS

Year.	Value in Dollars.
1921	42,084,000
1922	26,750,000
1923	29,400,000

Canadian imports of chemicals are thus shown to be about twice the value of the exports from the Dominion of Canadian-made chemical products. A considerable quantity of these materials is imported free of Customs duty, and there is likely to be some demand for increased protection of certain branches of the industry affected by the free importation of these articles.

Perhaps the most outstanding event during 1923 in the Canadian chemical world was the decision of Messrs. Courtauld's, Ltd., to establish a plant for the manufacture in Canada of artificial silk to supply the large domestic demand in the Dominion formerly met by importation from the United States and elsewhere. This industry will enjoy protection equivalent to that conceded to silk manufacturers. The Canadian Salt Company is now meeting the domestic demand for caustic soda and liquid chlorine.

The Microscope as an Aid to Analysis

Society of Chemical Industry: Nottingham Section

At a meeting of the Nottingham Section of the Society of Chemical Industry, on Wednesday, January 23, two papers were read on the subject, "The Microscope as an aid to Analysis."

The first paper by Mr. W. Woodhouse gave the result of many investigations at the Stanton Iron Works, where the microscope determined many factors which often could not be arrived at by chemical analysis alone. The apparently abnormal content of phosphorus or silicon, for example, as determined by routine chemical analysis, was explained and confirmed by a microscopical examination, which thus saved much time if a second analysis was undertaken. A number of microphotographs were shown on the screen illustrating essential points of structure of such things as conductor bolts, cast-iron pipes, spun cast pipes, etc., and the comparison of the structures of chill castings and white iron. The connection between strength and structure could often be shown by microscopic examination, whereas chemical analysis would not account for unsuitability for some particular purpose.

Importance to the Practising Chemist

The second paper, by Mr. S. R. Trotman, M.A., F.I.C. (read by Mr. R. W. Sutton, B.Sc., A.I.C.), showed the importance of the microscope to the general practising chemist, who had to attack innumerable technical problems of a varied nature. Enumeration of general types of such problems followed, the chief being the quantitative estimations of fat in butter, fatty acids in soap, foreign constituents in foodstuffs, and ingredients in mixtures of unknown origin and constitution. Then there were many qualitative examinations and identifications, such as the causes of various discolourations of textile fabrics. In many of these problems, the microscope was of the greatest assistance, and often very little other apparatus was required, although a polariser was useful, and sometimes macerating agents, selective stains and chemicals were used. For really effective work with the microscope, some fair knowledge of subjects like botany, textile technology, etc., were necessary. Thus, in the examination of a sample of ground oats, adulteration with barley meal was often shown by the microscope. The only method of quantitatively estimating the adulterant was by microscopical examination of made-up mixtures of the two substances in different proportions, and comparing the number of barley starch grains with that of the sample. Similarly, an adulterated sample of sumach could be detected by close examination of the characteristic cuticles of the macerated ground leaf, and comparing with similarly macerated samples of likely adulterants. Then followed an outline of methods where the microscope was a useful adjunct to chemical examination, such as the detection of chicory in coffee, husks in cocoa, etc. In connection with textile materials, destroyed cuticle in cotton fibres, rupture of fibroin thread in silk fibres, were primarily detected by the aid of the microscope.

Points Raised in Discussion

In the discussion on the papers, Mr. Adams referred to examples of the failure of certain metals in railway service, the explanation of which was only given by the microscope. Thus elongation of an axle (1 in 12) was clearly shown by microscopical examination to have been caused by excessive heat followed by sudden quenching. The cause of failure of other metals such as copper, white or bearing metals was clearly shown by the aid of the microscope which undoubtedly was an indispensable instrument in every engineering laboratory.

Mr. Pentecost referred to the cause of so-called "stains" on silk fabrics, which had been shown by the microscope to be due to fracture of silk fibres.

Miss Wright spoke of the value of the microscope in determining the fineness of particles in paints and pigments.

Mr. H. Droop Richmond mentioned other uses of the microscope such as the information obtained in determining the source and suitability of varieties of kieselguhr. He also referred to the use in crime detection such as examination of blood stains, dust samples, etc.

Chemists and Advertising

To the Editor of The Chemical Age.

Sir,—We have been more than usually interested in the contribution on professional advertising appearing in your issue of January 12 and the subsequent letter giving Mr. D. Brownlie's views on this subject.

We gather from the general terms of the article in question that your contributor had especially in mind the case of the chemical engineer. Whatever decision is reached on the propriety of advertising, it will be applicable to the professions generally. Ultimately the professional man in this country will advertise because right advertising is the logical and ethically unassailable means of extending this practice.

Mr. Brownlie submits that "it is perfectly logical, ethical, and moral for Messrs. Beaker and Flaske, Analytical, Consulting and Research Chemists, to advertise *in any way they like.*" Undoubtedly, as reference to the daily press will show, there are many ways of advertising that Messrs. B. and F. could not adopt without serious loss of professional status. Neither in statement nor in implication must an advertisement exceed the truth. As your contributor says, "If the subject matter of an advertisement is strictly accurate, what possible objection can there be to its publication."

It is through an impression that advertising is a manner of catch-penny "boosting" that professional men have condemned it. Such advertising rapidly defeats its own ends when it is directed towards an intelligent section of the public. As we have expressed it elsewhere, "Advertising, as we conceive it, is, simply, an interpretation of truth. Through it you tell the plain, honest facts of your business to all whom you would like to tell. It is a case of putting exact truths as briefly, as convincingly and clearly, and as pleasantly, as possible."—Yours, etc.,

The Technical Advertising Service,
J. Bertram Ward.

44, Bedford Row, W.C.1.

Death of Professor Robert Thompson

Professor Robert R. Thompson, who was Professor of Heavy Oils at Birmingham University, died under strange circumstances at Folkestone on Thursday, January 24. His wife and two young children left for the South of France on Sunday, and since then he had been living alone at his flat at Clifton Mansions. On Thursday evening, as nothing had been heard of him during the day, other residents in the mansions summoned the police, who found the professor lying dead on the floor.

Professor Thompson was about 40 years of age and had recently been appointed adviser to the British West Indian Petroleum Syndicate. An inquest was opened on Friday by the Folkestone Coroner and was adjourned until Monday, when his mother, Mrs. E. Makings, gave evdence of identification.

Dr. Barrett said that he had made a *post-mortem* examination, and said that the kidneys showed signs of Bright's disease, and other organs were such as one would expect to find in a case of malaria. Death was due to asphyxia, set up during uremic convulsion, and if anyone had been in the room at the time of the convulsion the professor's life could have been saved.

A verdict of death from natural causes was returned.

The Training of the Chemist

Dr. R. B. Abell, of Bradford Technical College, lectured last week to the members of the Leeds section of the Institute of Chemistry at the Queen's Hotel, when Professor J. W. Cobb, of the University of Leeds, presided.

Speaking of "The Training of the Chemist," Dr. Abell said that the schools of chemistry had developed into schools of training rather than of research, and three years of training was held to be necessary before a man was considered fit to undertake research. Comparing the university-trained chemist with those men who were trained in laboratories as apprentice or pupil, he said the main disadvantage for a pupil in a laboratory was that he did not, as a rule, have facilities for studying anything beyond chemistry. On the other hand, whilst he did not know enough physics to understand his chemistry, he possessed a good technique, which was lacking in the university or college student. He would define a chemist as a person who could attack any chemical problem intelligently, logically, and successfully.

Chemical Industry Annual Congress

Executive Committee Appointed for Liverpool

FOR the fifth time in its history the Society of Chemical Industry will visit Liverpool early in July next for its annual meeting. Previous Liverpool congresses of the society have been held in 1886, 1893, 1902, and 1913. Preparations for the 1924 meeting took practical shape on Monday, when the Lord Mayor (Mr. Arnold Rushton) presided over a meeting at the Town Hall, at which organising and executive committees were appointed. He was accompanied by Dr. E. F. Armstrong, president of the society, and the representative gathering included Sir Max Muspratt, Dr. G. C. Clayton, M.P., Mr. John Gray, and many others associated with chemical industry and research work.

The Lord Mayor recalled that the formation of the society in 1881 was largely due to the zeal and enterprise of Merseyside chemical manufacturers, the late Dr. E. K. Muspratt being one of the pioneers. Other past presidents associated with Liverpool and district were Dr. Mond, Mr. Eustace Carey, and Mr. John Gray. The society had about 5,000 members and eighteen branches or sections in the United Kingdom, Australia, Canada, and the United States. The forthcoming congress was already assured of the support of the civic authorities and of the Chamber of Commerce, and it was hoped also to enlist the active interest of the various branches of the chemical industry, kindred societies, representatives of the University, and of the business community. Everything pointed to a most successful congress.

Importance of the Industry

Dr. Armstrong said that next to shipping, the chemical industry was the most important on Merseyside. The society catered for all those interested in the advancement of chemical industry, and the promotion of science in industry generally. It included in its ranks directors, works chemists, process managers, research chemists, and academic, consulting and analytical chemists of every type. It was, therefore, both representative and essentially democratic. Its chief aims were to advance the science of chemistry in the interests of social service, and to keep its members in touch with the progress of applied science by means of its publications. The annual meeting offered valuable opportunities for mutual intercourse and the exchange of ideas. They realised that the humanities counted even more than the sciences, and it was on the side of the humanities that the greatest progress was to be made. Many famous names had been connected with the Liverpool section of the society, and, with such great traditions behind it, he believed the forthcoming meeting would be as great a success as its predecessors in the city.

The following officers of the executive committee were elected :—Chairman, Mr. Edwin Thompson ; vice-chairman, Professor W. H. Roberts ; hon. treasurer, Dr. Alfred Holt ; hon. secretary, Mr. E. Gabriel Jones.

Safeguarding of Industries Act

Lord Colwyn's Plea for Chemical Industries

THE annual luncheon of the India Rubber Manufacturers' Association, Ltd., was held at the Midland Hotel, Manchester, on Tuesday, January 22. Mr. E. Healey (W. & A. Bates, Ltd.) presided over a very large gathering.

Lord Colwyn of Colwyn (Macintosh & Co., Ltd.), in proposing the toast of "The General Committee of the India Rubber Manufacturers' Association, Ltd," made reference to the Safeguarding of Industries Act. He said he was one who had a close personal interest in the Act. The matter came up with Lord Balfour of Burleigh's Commission, and before that he had been always, probably for 30 years, a consistent free-trader. The evidence brought before the Commission was of such importance and of such value, and the facts so pregnant, that when it came to signing the report of Lord Balfour's Commission he signed it with the recommendation of the safeguarding of industry. The Safeguarding of Industries Act was brought in on account of the danger that came to the country at the time of the war. We had very little power in the chemical world, and Germany controlled spelter, lead, incandescent mantles, and even the needles that we used to make hosiery. All these had been eliminated from manufacture in our own country because of the prices that Germany could import them at in our market.

Importance of Chemical Industry

Some things were essential to the national welfare. One of them was the chemical industry. Those who had closely read the reports of the Investigating Committee from Germany saw the immense amount of chemicals which were used for the manufacture of poison gas, and the development of those chemical works during the war was of such a nature that Germany could make poison gas for the whole of the world. That was an essential danger. In time of war, one of the most essential things for the conduct of a war, and for the safety of the Empire, lay in the production of tyres, and other industries of a like nature. With regard to the Safeguarding of Industries Act, which he voted for in the Lords, and spoke for, he was just as strongly a supporter of that measure now as he was before it was passed. (Cheers). He felt, therefore, that whatever the additional cost might be it was for the welfare of the country that we should have essential industries protected against the foreign exporter. It showed the fairness of the Safeguarding of Industries Bill that when some trades went in for protection the Investigating Committee reported against giving them protection because it was not to the interest of the nation that they should be protected. He spoke thus freely, because he wanted to put the position upon a basis, not of "protection" or "free trade," but of the welfare of the nation of which they were all a living part. (Cheers.)

Ramsay Memorial Fellowship Awards

THE scheme for Fellowships in Chemical Science in memory of the late Professor Sir William Ramsay has now come to full fruition. At the present time sixteen Fellowships for Chemical Science are being held in the Universities or Colleges of the United Kingdom. The complete list of awards for the present session is as follows. In each case the University or College, which has been selected by the Fellow for his research, is given :—

British Fellowships : Mr. Samuel Coffey, Ph.D. ; University College, London ; Mr. R. W. Lunt, Ph.D. ; University College, London ; Mr. A. F. Titley, B.Sc., Phil.D ; University of Oxford.

Glasgow Fellowships : Mr. J. A. Mair, B.Sc., University of Glasgow ; Mr. T. S. Stevens, B.Sc., University of Glasgow.

Canadian Fellowship : Mr. E. H. Boomer, Ph.D., University of Cambridge.

Danish Fellowship : Mr. K. Höjendahl, University of Liverpool.

Dutch Fellowships : Dr. C. F. van Duin, University of St. Andrews (temporarily absent on account of ill-health). Dr. J. Kalff, University of Liverpool.

French Fellowship : Dr. H. Weiss, Royal Institution, London.

Greek Fellowship : Temporarily vacant.

Italian Fellowship : Dr. A. Nasini, University of Cambridge.

Japanese Fellowship : Dr. N. Kameyama, University College, London.

Norwegian Fellowship : Mr. Gunnar Weidemann, University of Cambridge.

Spanish Fellowship : Dr. Miguel Crespi, University College, London.

Swedish Fellowships : Mr. A. W. Bernton, Phil.Lic., University of Oxford ; Mr. J. Lublin, Ph.D., University of Cambridge.

Swiss Fellowship : Temporarily vacant.

The total value of the annual amount of the Fellowships that is awarded is £5,007, of which £3,500 is provided by grants from Dominion and Foreign sources.

Calcium Arsenate Supplies in U.S.A.

CALCIUM ARSENATE at present is in poor demand in the American market, and little is being manufactured. Last year at this time there was a heavy demand, owing to the expected requirements for fighting the boll-wevil, and according to *Drug and Chemical Markets*, the present policy is likely to result in a shortage later in the year. Last year it will be remembered British makers were asked to supply this chemical at the height of the demand, which was afterwards found to have been overestimated.

From Week to Week

MR. SRI KRISHNA, of King's College, London, has received the degree of D.Sc. in Chemistry.

THREE GERMAN DIRECTORS are reported to have been appointed to the Fabrica Lombarda, an Italian dyestuff plant near Milan.

MR. EDWIN JAMES HUNT, chemical manufacturer of the firm of Chance and Hunt, Oldbury, has been appointed a justice of the peace for the county of Worcestershire.

THE ANGLO-ITALIAN COMMERCIAL AGENCY, LTD., announce that they have changed their address from Aldersgate Street to 162, Grosvenor Road, Vauxhall Bridge, S.W.1, where for the future both their offices and depot will be located.

DR. A. W. PORTER, D.Sc. (Melbourne), B.Sc. (Lond.), F.R.S., has been appointed to the University Chair of Physics at University College. Since 1913 he has been University Reader in Thermodynamics.

IN A LECTURE read before the North-East Coast Institution of Engineers and Shipbuilders and the North of England Institute of Mechanical Engineers, Professor Poole said that experiments showed that the presence of stone dust in mines not only prevented the progress of a flame but tended to damp it out.

A FIRE OCCURRED at the Co-operative Wholesale Society's Paint, Varnish, Colour and Turpentine Works, at Rochdale, on Wednesday, January 23. The damage being estimated at £40,000. Several turpentine tanks burst, causing loud explosions. The main warehouse was burnt out, but the other departments were saved.

AS A RESULT of the recent railway strike, at some of the Runcorn chemical works, provisional notices to the workers were posted, but so far the strike did not materially affect the industrial position. A brisk output was maintained and deliveries within 100 miles of the town were made by augmented road transport.

DR. C. H. DESCH, Professor of Metallurgy in Sheffield University, will give an illustrated public lecture on "The Physicist in Metallurgy" in the room of the Chemical Society, Burlington House, London, on Wednesday, February 6, at 5.30 p.m. Sir Charles Parsons, president of the Institute of Physics, will preside. No ticket of admission is required.

MR. SAMSON CLARK, of East Molesey, chairman of Samson Clark and Co., Ltd., the advertising service agents, of Mortimer Street, London, W., and former Parliamentary candidate for the Chertsey Division of Surrey, asks us to state that he is not in any way connected with a Mr. Samson Clark against whom a receiving order in bankruptcy was gazetted last Saturday.

THE GERMAN DYE CARTEL, it is stated, has contracted to deliver 150,000 kilos of aniline and alizarine dyes to the Soviet Textile Syndicate. Several Saxon and Thuringian textile manufacturers are stated to be planning to transfer some of their activities to Russia, and are reported to be negotiating for concessions.

DR. T. J. MURRAY, head of the chemical and metallurgical department of the Wolverhampton Technical School has resigned that position, having been appointed Principal of the Smethwick Technical School. The resignation was accepted with regret by the Wolverhampton Education Committee who recorded their appreciation of Dr. Murray's valuable services.

MR. H. LLOYD HIND, B.Sc., read a paper on Friday, January 25, before the Scottish Section of the Institute of Brewing, on "The Beer of the Future." In it he described the Stream Line Filter, and said that he believed it was only a matter of experiment and adjustment of details and manipulation to the special conditions, before the invention found application in the brewing industry.

PYRIDINE has been suggested by the Liverpool City Analyst as an addition to methylated spirit to render it unpalatable without impairing its utility for legitimate purposes. The matter is reported to be under consideration by the Home Office. It is understood that there has recently been an increase in methylated spirit drinking and the addition of pyridine bases should certainly check the practice.

MR. G. FORSTER, of Wakefield, the organiser of mining education for the West Riding, gave a lecture to the Yorkshire Colliery Under-Managers' Association at Normanton on Saturday, January 26, on the "Use of Explosives in Mines." He pointed out that permitted explosives were not absolutely safe and urged that every precaution should be taken in order that the standard of safety in the mines might be raised.

AT A JOINT MEETING of the Glasgow local sections of the Institute of Chemistry and the Society of Chemical Industry held on Friday, January 25, Mr. F. W. Harris, Corporation chemist and city analyst, read a paper on "Modern Methods of Sewage Purification." After giving a brief description of the obsolete method of septic tank treatment, the lecturer passed on to a short study of land filtration and the latest methods of bio-aeration, usually referred to as the "activated sludge."

AT A SUPPER and concert arranged for the employees of Thos. Hill-Jones, Ltd., of Bow Common Lane, E.1, held on Friday, January 25, a presentation was made by the employees to the managing director of the firm, Mr. T. Miller-Jones, recently Conservative candidate for the Limehouse Division of Stepney, of an inscribed cigarette-case. The inscription says the presentation is made "as a mark of appreciation of his efforts towards bridging the gulf between Capital and Labour."

A JOINT MEETING of the London Section of the Society of Chemical Industry and the Chemical Engineering Group will be held at 8 p.m. on Monday, February 4, 1924, in the "Kelvin" Room of the Engineers' Club, London, when a paper will be read by Professor J. W. Hinchley, on "The Manufacture of Potash and Other Salts from Leucite." The Chairman of the London Section, Dr. Bernard Dyer, will preside, supported by the Chairman of the Chemical Engineering Group, Mr. J. Arthur Reavell.

DR. W. M. THORNTON, Professor of Electrical Engineering at the Armstrong College, Newcastle, in a meeting of the North-East Centre of the Institute of Electrical Engineers on Monday, demonstrated a device which he had perfected for enabling acoustic warning of the presence of dangerous gas in coal mines, to be given to the miner, when it was fitted to the ordinary Davy lamp. The invention is based on the fact that in the presence of dangerous gas the flame becomes hotter, which affects an electrical apparatus which may be used to light a warning lamp or ring a bell.

DR. FREDERICK M. BECKET, vice-president of Union Carbide and Carbon Research Laboratories, received the Perkin Medal, annually awarded by the Society of Chemical Industry for the most valuable achievement in applied chemistry, at a meeting of the American Section of the Society, at the Chemists Club, New York, on Friday, January 11. The presentation was made by Professor Charles F. Chandler. Professor M. McKee, of Columbia University, presided. Among the noteworthy achievements of Dr. Becket are his discovery and development of the process for reducing ores by silicon and the production of ferro-vanadium on a commercial scale.

WE HAVE RECEIVED four paper-bound books printed in Russian, which proved on examination to be copies of the *Journal* of the Russian Physico-Chemical Society of Petrograd University for the past 18 months. A contents page in French gives some idea of the amount of scientific work being done in Russia, papers on theories such as the space formation of benzene, naphthalene, etc., double decomposition in the absence of solvents, etc., practical work on absorption, electrolysis and condensation problems forming the bulk of the matter. Any readers who have the ability to read Russian may be interested to know that the volumes were supplied by Kniga, Ltd., of Lincoln's Inn Fields, London.

AT THE JANUARY Examinations of the Institute of Chemistry the following candidates passed the examination for the Associateship in General Chemistry:—D. S. Cohen, East London College; R. C. Doyle, Chelsea Polytechnic; H. C. Exell, King's College, London; H. H. Goldthorpe, B.Sc. (Lond.), Huddersfield Technical College; A. T. S. Hare, Heriot-Watt College, Edinburgh; F. P. Hornby, University College, Southampton; and Northern Polytechnic Institute; J. Johnston, B.Sc. (Lond.), Heriot-Watt College, and the University, Edinburgh; A. N. D. Pullen, University College, Reading, W. H. Radford, University College, Nottingham; R. W. Watridge, B.Sc. (Lond.), University College, Southampton; R. J. Wood, East London College. Nineteen candidates failed to satisfy the examiners.

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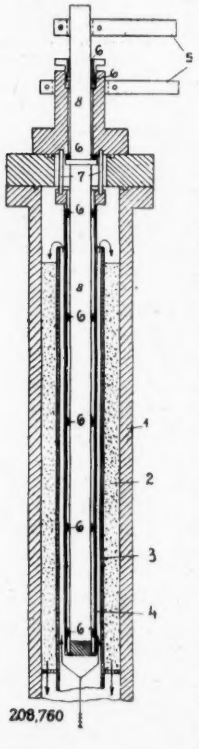
Abstracts of Complete Specifications

208,751. CELLULOSE, MANUFACTURE OF. F. C. Thornley and F. F. Tapping, Hyde Park Hotel, Knightsbridge, London, S.W.1, and O. Reynard, 8, Inkerman Terrace, London. W.8. Application date, August 29, 1922.

The process is for the manufacture of cellulose from finely divided woody matter, such as sawdust, wood waste, wood pulp and other substances of vegetable origin. The material is treated with sulphur dioxide gas in a very fine state of subdivision, produced by intense agitation. The gas is thus rendered more chemically active, and is adsorbed by the solid material. The latter is subjected to intense agitation in a liquid medium simultaneously with its exposure to the action of the finely divided sulphur dioxide. The product consists mainly of solid cellulose and a liquid containing the non-cellulose constituents of the raw material. This liquid contains sulphur dioxide in solution, and may be used again with a small quantity of fresh liquid for treating more raw material. In this process the resins and gums almost immediately pass into colloidal solution, and the surface tension between the raw material and the liquid medium is lowered, which facilitates the adsorption of the gas. It is found that highly resinous sawdust may be converted into nearly pure cellulose in two hours by this method. The liquid medium may be water, lime water, milk of lime, sodium carbonate, or other soluble alkali, or it may contain the oxide, hydroxide, or carbonate of an alkaline earth metal in suspension. The operation may be effected in a gas-tight vat containing a propeller mounted on a vertical shaft, and the sulphur dioxide may be introduced at the bottom. The vat is heated to about 100° C., and the process is complete in 2—12 hours. The liquid by-product is relatively small in quantity and readily disposed of.



208,760. ELECTRICALLY HEATING GASES UNDER PRESSURE FOR USE IN THE CATALYTIC PRODUCTION OF AMMONIA, MEANS FOR. J. Y. Johnson, London. From Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Application date, September 20, 1922.

The object is to avoid the difficulties which are experienced when gases under high pressure are electrically heated by means of a heating coil of insulated wire, the heating device being adapted for easy removal from the apparatus. In this invention the cross-section of the electric resistance is sufficiently large to make it self-supporting and to enable it to be heated with low-tension current. It is usually sufficient to insulate one of the two electrodes, and direct or alternating current may be employed. The heating element consists of a tube provided with a concentric rod or bar, or a double tube, the inner member being electrically connected with the outer at the end furthest from the point of introduction into the apparatus. The heater may be used to heat the filling material or contact mass in the high-pressure apparatus, or for heating the gases, or both.

An apparatus suitable for ammonia synthesis comprises a strong containing tube 1 and a spacing tube 3, between which the contact mass 2 is placed. The heating element comprises an outer tube 4 and an inner rod or tube 8, connected together at the bottom and connected at the top to supply leads 5. The differences in longitudinal expansion may be compensated by copper wire ropes 7. The gas passes upwards round the tube 4 and then downwards through the contact material 2.

208,761. CONDENSATION PRODUCTS OF FORMALDEHYDE AND CARBAMIDE OR CARBAMIDE DERIVATIVES, MANUFACTURE OF. H. Goldschmidt, Krothastrasse, 13/15, Berlin, Grunewald, Germany, and O. Neuss, Kirschenallee, 13, Berlin-Charlottenburg, Germany. Application date, September 20, 1922.

These condensation products are suitable for use as substitutes for celluloid, horn, glass, etc., and are produced from formaldehyde and carbamide or carbamide derivatives, or initial substances such as cyanamide, which in the course of the reaction are converted into urea and its derivatives. It is found that the reaction is accelerated by the presence of small quantities of acids or acid salts as condensing agents, in the proportion of not more than 0·5 per cent. in relation to the urea. It is known that in order to obtain hard material of glass transparency it is necessary to use 1 part of carbamide to 6 parts of 30 per cent. formaldehyde. In this invention, the proportion of formaldehyde may be reduced to 5 parts if about 0·013 parts of hydrochloric acid is added to the initial substances. The mixture is boiled until a sample gelatinises on cooling, and the time of polymerisation depends on the proportion of acid and the concentration. To produce a cloudy material of similar properties the proportion of formaldehyde may be reduced to 4·5 times that of the urea. The use of condensing acids produces a much quicker solidification of the product, and the use of a drying kiln is not necessary.

208,779. VULCANISATION OF RUBBER. P. C. Rushen, London. From the Naugatuck Chemical Co., Elm Street, Naugatuck, Conn., U.S.A. Application date, September 26, 1922.

Specification No. 180,078 (see THE CHEMICAL AGE, vol. vii, p. 179) describes a process of vulcanisation using an accelerator consisting of the reaction products of the aliphatic straight chain aldehydes containing more than one carbon atom in the chain, and an amine, *e.g.*, acetaldehyde and aniline. Similar products are used in the present invention. The term aliphatic amine is intended to include certain heterocyclic amines, and is defined as a substance in which nitrogen is joined to a methyl group which is not a member of a ring—*e.g.*, benzylamine and piperidine. Examples of the substances used are the condensation product of formaldehyde and ethylamine, triethyl-trimethylene-triamine; the condensation product of benzylamine and formaldehyde, tribenzyl-trimethylene-triamine; the condensation product of diethylamine and formaldehyde, tetraethyl-methylene-diamine; and of piperidine and formaldehyde, dipiperidyl-methylene-diamine. These condensation products may undergo polymerisation on storage, and the use of such polymers is also included. The condensation products may have an objectionable odour, and this may be overcome by the addition of stearic acid which forms soaps with these products. The material thus obtained is readily incorporated with the rubber by milling. Other substances which have an effect similar to stearic acid are zinc acetate, calcium acetate, zinc hydroxide, aluminium chloride, cobalt chloride, lead acetate, magnesium acetate, sodium acetate, and zinc chloride. In an example, a mixture of rubber 100 parts, zinc oxide 100 parts, sulphur 7 parts and the addition product of stearic acid and triethyl-trimethylene-triamine 2 parts, is vulcanised in open air at 275° F. in 2½ hours.

208,904. HOMOGENEOUS MIXTURES, PROCESS FOR MAKING. J. E. Pollak, London. From J. D. Riedel Akt.-Ges., 1/32, Riedelstrasse, Berlin-Britz, Germany. Application date, December 16, 1922.

The object is to obtain a homogeneous mixture of organic substances which are insoluble in water, with water soluble organic substances which are known to be solvents for many substances. The homogeneous mixture is produced by adding one or more hydro-aromatic alcohols or ketones to organic water-insoluble substances and organic water-soluble substances containing or dissolved in water. The water-insoluble substances used are hydrocarbons such as benzene, hydrogenised naphthalenes, oils, fats, waxes, resins, etc. The water-soluble organic substances used are acetone, methyl, ethyl, or propyl alcohol, salts of fatty acids or resinous acids which also contain water. These mixtures retain their homo-

geneity when further quantities of water are added. The hydro-aromatic alcohols or ketones may first be mixed with one of the ingredients such as benzene, and the other ingredient —*e.g.*, spirit—then added. In an example, a mixture of benzene, spirit (containing water), and cyclo-hexanone may be used as a motor spirit, and remains homogeneous at low temperature. In another example, a mixture of artificial or natural resin, or a cellulose ester, with benzene and alcohol (containing water) and hydro-aromatic alcohols may be used as a lacquer. In another example, a coating of resins, fats, oils, waxes, etc., may be removed from a surface by treating with a mixture of benzene and aqueous solutions of salts of fatty or resinous acids made homogeneous with terpene. This mixture is much more effective than non-homogenised mixtures. Suitable aromatic alcohols or ketones mentioned are terpene, terpineol, pulegon, cyclohexenone, fenchone, etc.

208,911. Starch Preparations, Manufacture of. Plauson's (Parent Co.), Ltd., 17, Waterloo Place, Pall Mall, London, S.W.1. From H. Plauson, 26, Jarrestrasse, Hamburg, Germany. Application date, December 23, 1922.

Starch-containing material is mechanically colloidalised in the presence of water and another substance such as caustic soda which is capable of hydrolysing starch, in a high-speed colloid mill such as that described in Specification No. 155,836 (see The Chemical Age, vol. iv, p. 313). This colloidalisation may be effected at a temperature materially below the gelatinising point of the starch-containing material—*e.g.*, at 40° to 50° C. A fatty material may also be added to the mixture in the mill.

208,929. Boron Containing Ores, Treatment of. A. Kelly, 57, Chancery Lane, London, W.C.2. Application date, January 16, 1923.

The object is to obtain alkali pentaborates from ores containing boron, such as boro-natro-calcite. The ore is mixed with alkali, if necessary, and treated with the requisite quantity of metallic sulphate such as ferric or aluminium sulphate, but not sodium sulphate or acid sulphate, these sulphates may be natural or artificial. It is found that no special treatment for the removal of the arsenic in the ore is necessary, since this arsenic is retained in the residual mud on treating with the sulphate. In an example, 50 lb. of the mineral is heated to 80°C., and treated with 40 lb. of ferric sulphate in concentrated solution containing 22·5 per cent. of SO_3. The mixture is heated to 95° C. for 45 minutes, and another 40 lb. of the mineral added. This reduces the temperature to 70°—75° C., at which it is maintained for 45 minutes, yielding a concentrated solution of sodium pentaborate and a residue of calcium sulphate and ferric hydroxide. A yield of 91 per cent. of sodium pentaborate is obtained. The original ore contained 800 parts per million of arsenic, and the sodium pentaborate obtained from it only 2 parts per million. The pentaborate is thus particularly suitable for the production of pure borax or boric acid.

Note.—Abstracts of the following specifications which are now accepted, appeared in The Chemical Age when they became open to inspection under the International Convention: 193,385 (Society of Chemical Industry in Basle) relating to manufacture of dyestuffs capable of being chromed, see vol. viii, p. 466; 195,366 (Mathieson Alkali Works, Inc.) relating to manufacture of hypochlorites, see vol. viii, p. 599; 195,098 and 195,400 (Farbwerke vorm. Meister, Lucius and Brüning) relating to separation of mixtures of gases and vapours see vol. viii, pp. 577 and 600; 196,935 (W. Vogelbusch) relating to concentrating devices, see vol. viii, p. 708.

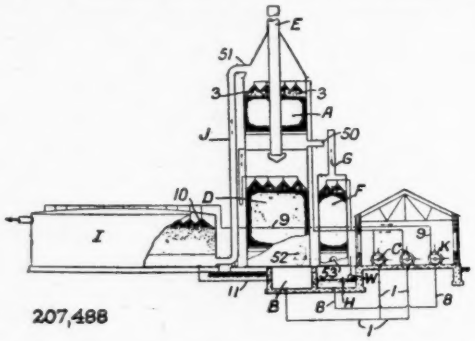
International Specifications not yet Accepted

207,196. Purifying Gases. Farbenfabriken vorm. F. Bayer and Co., Leverkusen, near Cologne, Germany. International Convention date, November 20, 1922.

Gas is purified from sulphuretted hydrogen by passing it with air or sulphur dioxide through porous silicic acid (activated silica gel). The sulphur may afterwards be extracted and the silica gel purified by means of a solvent such as carbon disulphide, mono- or dichlorbenzene, or tetrahydronaphthalene. If only a small proportion of sulphuretted hydrogen is to be removed the extraction is facilitated by adding a base such as ammonia or an amine. The silica gel may be freed from the solvent after purification by means of steam. In one example, generator gas containing 3 grammes of sulphuretted hydrogen per cubic metre may be purified by mixing with 1 per cent. of air and 0·01 gramme of ammonia per cubic metre and passing through silica gel.

207,488. Purifying Gases. Koppers Co., 800, Union Arcade Building, Pittsburg, U.S.A. (Assignees of E. H. Bird, 800, Union Arcade Building, Pittsburg, U.S.A.) International Convention date, November 24, 1922.

Coke oven gas is purified from sulphuretted hydrogen and hydrocyanic acid in two stages in two separate purifiers. The gas passes through a scrubber A from inlet 50 to outlet 51, and thence by a pipe J to a scrubber I. Sodium carbonate solution is sprayed on the coke filling of the scrubber A and then passes



into a similar apparatus D where it is revivified by air which passes upwards to an outlet pipe E. The larger part of the revivified solution passes from the sump B through pumps C to the sprayers 3, and the remainder passes to a second revivifier F. This solution is treated again by means of air, and is then forced by a pump K to the sprayers 10 in the final purifier I, which may contain filling material of large surface such as shavings.

207,499. Formaldehyde Condensation Products. Naugatuck Chemical Co, Elm Street, Naugatuck, Conn., U.S.A. (Assignees of M. G. Shepard, 851, West End Avenue, New York, and H. S. Adams, 84, Cliff Street, Naugatuck, Conn., U.S.A.) International Convention date, November 27, 1922.

Hexamethylene tetramine, or a formaldehyde solution and ammonia, is condensed with ethyl chloride, methyl iodide, butyl iodide, ethyl iodide or bromide, or their mixtures, to obtain trialkyl-trimethylene-triamines or their polymers in the form of their salts with halide acids. The base may be liberated by treating with caustic soda. The products are oils or resins according to the degree of polymerisation, and are used as vulcanisation accelerators.

207,547. Recovering Absorbed Vapours. Naamlooze Vennootschap Montaan Metaalhandel, 119, Keizersgracht, Amsterdam. (Assignees of Metallbank und Metallurgische Ges. Akt.-Ges 45, Bockenheimer Anlage, Frankfurt-on-Main, Germany.) International Convention date, November 23, 1922.

Porous materials, such as active carbon, silica gel, and alumina, which have been used for absorbing gases such as benzol vapour from air, are heated by the passage of an electric current to recover the absorbed material. The current may be passed directly through the material or may be proudced inductively. Carbon or metal powder may be mixed with the absorbent to increase its conductivity, or metal powder may be sprayed on the absorbent, or the absorbent may be treated with conducting liquid or with a substance which converts it into a conductor—*e.g.*, carbon into silicon carbide. Alternatively heating elements may be embedded in the material. Release of the absorbed substance may be assisted by a scavenging gas or vapour.

207,553. Dyes. Kalle and Co. Akt.-Ges., 23, Rheinstrasse, Biebrich-on-Rhine, Germany. International Convention date, November 25, 1922.

Methoxy-naphthalene-1·8-dicarboxylic-imide is obtained by heating the parent acid with ammonia, and is then fused with caustic alkali or sodium amide, with or without the addition of tetralin. The product is mainly the diamide of dimethoxy-perylene tetracarboxylic acid, and is a dyestuff dying wool and cotton blue shades from hydrosulphite vat.

207,555. TITANIUM OXIDE AND SALTS. P. Pipereant, 8, Rue Abel, Paris, and A. Helbronner, 49, Rue St. Georges, Paris. International Convention date, November 25, 1922.

Titanium ore such as ilmenite is heated with coal and sulphuric acid or with pyrites in a closed vessel. The reduced iron is dissolved out with dilute sulphuric acid, leaving insoluble titanic oxide. The oxide is converted into chloride by mixing with coal, heating to redness, and treating with chlorine, and the chloride vapour is mixed with dry sulphuretted hydrogen and passed through tubes heated to 400° C. Alternately the chloride may be condensed at 100° C., and then treated with sulphuretted hydrogen. The titanium sulphide is then roasted with or without zinc sulphate to obtain titanium oxide, with or without zinc oxide. If the sulphide is heated out of contact with air, a pigment consisting of titanium oxide, zinc sulphide, and barium sulphate is obtained.

LATEST NOTIFICATIONS.

210,081. Process of preparing azo dyestuffs. Farbwerke vorm. Meister, Lucius & Brüning. January 18, 1923.

210,094. Process for separating benzol or benzine from mixtures containing dilute alcohol. Stinnes-Riebeck Montan-und Oelwerke Akt.-Ges., H. January 22, 1923.

210,095. Manufacture of bismuth compounds. Farbwerke vorm. Meister, Lucius & Brüning. January 22, 1923.

Specifications Accepted, with Date of Application

191,032. Steel or iron, Process and apparatus for the production of by the direct treatment of ores freed from gangue. G. Constant and A. Bruzac. December 29, 1921.

193,030. Separating mixed liquids of different volatility, Process and apparatus for. A. J. M. Rialland. February 7, 1922.

195,590. Tunnel furnaces for metallurgical uses. Soc. Anon. J. Cockerill. March 30, 1922.

195,597. Solutions, Treatment of for the precipitation of solid substances therefrom. Aktieselskapet de Norske Saltverker. March 29, 1922.

196,585. Ammonium chloride lyes, Process for treating in iron vessels. Henkel et Cie and W. Weber. April 22, 1922.

209,188. Vat dyestuffs, Discharging. British Alizarine Co., Ltd., R. B. Harley, W. H. Dawson, and T. C. Nichol. July 6, 1922.

209,441. Titanium compounds. C. Weizmann and J. Blumenfeld. July 12, 1922.

209,458. Regenerator furnaces. H. J. Toogood and R. Dempster and Co., Ltd. September 13, 1922.

209,547. Azo colouring matter of the pyrazolone series. L. B. Holliday and Co., Ltd., and J. A. Stokes. November 17, 1922.

209,561. Neutralising ammonium sulphate, Process for. T. Nicholson. November 24, 1922.

209,569. Dyeing of animal fibres. Morton Sundour Fabrics, Ltd., and J. Thomas. December 2, 1922.

209,577. Pulverising machine for pulverising or refining minerals or other materials to fine powder. J. F. Holmes. December 7, 1922.

209,694. Hydroxyanthraquinones, Chlorination of. J. Thomas and Scottish Dyes, Ltd. July 8, 1922.

209,697. Synthetic resins and process of making same. A. E. Alexander. (J. S. Stokes.) August 11, 1922.

Applications for Patents

Aars, L. A., and Dicker, S. G. S. Production of white lead. 1,790–1791. January 22.

Anglo-Persian Oil Co., Ltd., and Cia. Industrial y Comercial de Petroleo Soc. Anon. Rotary core-boring, etc., apparatus. 2,048. January 25.

Bader, W., and British Celanese, Ltd. Manufacture of aliphatic compounds. 1,944. January 24.

Baron, C., Urbain, E., Verley, A., and Verola, P. Process for dehydrating alcohol. 1,825. January 23. (France, January 23, 1923.)

Dicker, S. G. S., and Wallace, G. W. Production of carbon or carboniferous products. 2,089. January 25.

Ellis, G. B., and Soc. Chimique des Usines du Rhône. Preparations of stable concentrated solutions of *p*-oxy-*m* acylamino phenylarsanilic acids. 1,764. January 22.

Farbwerke vorm. Meister, Lucius & Brüning. Manufacture of bismuth compounds. 1,799. January 22. (Germany, January 22, 1923.)

Harper, W. A., and Williams, W. M. Production of ammonia. 1,991. January 24.

Hooley, L. J., Scottish Dyes, Ltd., and Thomas, D. W. P. Manufacture of hydroxyanthraquinone derivatives. 2,148. January 26.

Hutchings, Ltd., J. and W. N., and Morrison, J. A. S. Tanning and manufacture of tanning materials. 2,158. January 26.

Lamb, A. B. Catalysts, and process of producing same. 1,777. January 22.

Metal and Thermit Corporation and A. Mond. Refractory materials and articles made therefrom. 1,850. January 23.

Metal and Thermit Corporation and A. Mond. Titanium oxide. 1,851. January 23.

Ricard, Allenet et Cie. Manufacture of butyl alcohol. 1,783. January 22. (France, July 7, 1923.)

Ricard, Allenet et Cie. Dehydration of mixtures of alcohol and bodies not mixable with water. 1,795. January 22. (France, February 3, 1923.)

Ricard, Allenet et Cie. Manufacture of absolute alcohol. 1,796. January 22. (France, February 15, 1923.)

Ricard, Allenet et Cie. Manufacture of absolute alcohol. 1,797. January 22. (France, April 16, 1923.)

Ricard, Allenet et Cie. Dehydration of organic liquids. 1,798. January 22. (France, May 9, 1923.)

Ricard, Allenet et Cie. Manufacture of absolute alcohol. 1,857. January 23. (Belgium, June 7, 1923.)

Soc. Nationale d'Industrie Chimique en Belgique Soc. Anon. Process for obtaining sulphurets from alkaline metals. 1,874. January 23. (France, January 23, 1923.)

Stinnes-Riebeck Montan-und Oelwerke Akt.-Ges., H. Separation of benzole or benzine from mixture containing dilute alcohol. 1,794. January 22. (Germany, January 22, 1923.)

Urbain, E., and Urbain, R. Manufacture of high-percentage alcohol. 1,824. January 23.

Chemical Merchant's Failure

MR. ROBERT MORRISON LAMBERT, drug and chemical merchant, 10, Great St. Helens, London, E.C., attended before Mr. Registrar Francke at the London Bankruptcy Court on Friday, January 18, for his public examination on a statement of his affairs in which he had returned the liabilities at £10,627, all of which were expected to rank, and disclosed as assets two book debts of the face value of £2,044, but expected to realise nothing.

The debtor stated that for many years before 1913 he was employed in a very old-established business of drug, chemical and essential oil merchants, which had been carried on by his father at 14, Mincing Lane, E.C., under the style of Samuel Lambert and Co. On the death of his father he took over the business, which he continued at the same address and under the same style. The trading, however, did not prove a success, and in March, 1914, he convened a private meeting of his creditors and executed a deed of assignment in favour of a trustee on behalf of his creditors in general. The trustee continued the business and paid dividends amounting in all to 10s. in the £. In 1916 he obtained his release under the deed, and he then took over and continued the business until December, 1921, when, owing to losses sustained owing to the non-fulfilment of contracts, he closed it. The debtor said that he afterwards shared an office with another person who carried on business as a chemical merchant, and who under an agreement provided the money necessary for the transaction of business which he introduced. It was agreed that they should each have a half share of the profits; at least he understood that was the case, but apparently as things turned out he was mistaken. In December, 1922, they ended that arrangement, and he had since acted as managing director of a limited company carrying on business as drug and chemical merchants at a remuneration of £360 per annum. Asked what shareholding he possessed in the company the debtor replied that he held the shares necessary to qualify as a director; although the company was still in existence it was not doing anything. It was, however, "being kept on." Since 1920 he had incurred a total loss in trading of £3,000, and he admitted that for several years past he had carried on business on borrowed capital. Indeed, since the year just mentioned he had incurred liabilities for cash amounting to £2,750.

The examination was ordered to be concluded.

Dyestuff Calendars for 1924

A VERY neat combined ticket holder, diary, and calendar is issued by the British Dyestuffs Corporation. It contains a list of the Corporation's works, offices, overseas branches, and agents, together with a collection of useful chemical tables.

Scottish Dyes, Ltd., also issue a combined calendar, diary and notebook, in which notes with identification and fastness tables are given of the firm's Caledon and Solway colours. There are also useful practical instructions as to dyeing and textile printing methods.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

London, January 31, 1924.

BUSINESS has shown a decided improvement during the past week, and a satisfactory volume of orders have been placed. Inquiry for forward delivery has also been in evidence and there appears generally more confidence in the market. Prices remain firm, and some products appear to be in short supply.

Export inquiry is more interesting and a fair amount of business has been transacted.

General Chemicals

ACETONE is without change in price and in constant request.

ACID ACETIC is scarce and price has advanced. What little stock is available is eagerly sought after and a further advance is not unlikely.

ACID CITRIC in slightly better request, although price shows no improvement.

ACID FORMIC is practically unobtainable on the spot. Price had advanced, and little relief in the delivery position can be expected until the Reparation question is settled.

ACID LACTIC.—Market exceedingly firm with little material offering.

ACID OXALIC is noticeably firmer with an increasing demand. Stocks are not abundant.

ACID TARTARIC.—No improvement in price or demand is apparent.

BARIUM CHLORIDE is in slightly better request with price in buyers' favour.

BLEACHING POWDER is in fair demand on export account.

FORMALDEHYDE.—Price shows a firmer tendency on the week and the demand is better. An increase in price is not unlikely.

LEAD ACETATE has again advanced, and supplies are extremely limited.

LIME ACETATE is in constant request for near and forward delivery. Price remains firm with little material available.

LITHOPONE.—Unchanged in price, although a better demand has been experienced.

POTASSIUM CAUSTIC AND CARBONATE.—A better demand for caustic has been reported, but there is no change in price for either.

POTASSIUM PERMANGANATE is in small demand without change in price.

POTASSIUM PRUSSIATE has only been in poor request, but price shows no further change. A slight advance will probably take place as demand improves.

SODA ACETATE has been in good demand for near and forward delivery, and price is much firmer.

SODA PHOSPHATE in better request, but price has not changed.

SODA NITRITE in active demand with little material available. Price firmly maintained.

SODA PRUSSIATE.—No improvement in price or demand can be reported.

Pharmaceutical Chemicals

ACETYL SALICYLIC ACID.—A continued steady demand is reported. Supplies are none too plentiful, the market consequently having a firm tendency.

ACETANILID is slightly in buyers' favour at the moment.

BETANAPHTHOL RESUBLIMED is in short supply.

BROMIDES are firm in sympathy with the Continental situation.

COCAINE.—The alkaloid is scarce and commands a premium.

EUCALYPTUS OIL.—The prices realised for recent consignments are reported to be unsatisfactory to Australian shippers.

GUAIACOL is in better demand.

METHYL SALICYLATE is in short supply, imports from the Continent being below the average.

MILK SUGAR is in good demand and has advanced in price. Stocks are firmly held, the outlook being exceedingly firm. A further advance is expected.

MORPHINE.—The leading English manufacturers have advanced their prices on account of the advanced figures asked for opium.

SODA SALICYLATE is unchanged.

VANILLIN is firmer.

Coal Tar Intermediates

Trade has continued quiet during the past week as a result of the railway strike, although there is little change in prices to report.

ALPHA NAPHTHOL is unchanged.

ALPHA NAPHTHYLAMINE has been inquired for on both home and export account.

ANILINE OIL has been inquired for, the price remaining unchanged.

ANILINE SALT is of interest for export.

BENZIDINE BASE is in small demand.

BETA NAPHTHOL continues to be of interest for both export and home trade.

DIMETHYLANILINE is without change.

DIPHENYLAMINE is without special feature.

NITRO BENZOL.—Some home trade business has been placed.

PARANITRANILINE continues on quiet lines.

"R" SALT is unchanged.

RESORCINE has been inquired for and stocks are scarce.

XYLIDINE is unchanged.

Coal Tar Products

The market generally is somewhat dull, and prices have an easier tendency.

90% BENZOL still remains plentiful at 1s. 1d. to 1s. 1½d. per gallon on rails, for prompt delivery.

PURE BENZOL.—Can be bought at 1s. 4d. to 1s. 5d. per gallon on rails.

CREOSOTE OIL is hardly so firm, and although at present there is no great decline in value, a slight fall in price is probable. To-day's values are 8½d. to 8¾d. per gallon in the North, while the price in the South is from 9½d. to 9¾d. per gallon.

CRESYLIC ACID is quoted at 1s. 10d. per gallon on rails for the pale quality 97/99%, while the dark quality 95/97% is quoted from 1s. 6d. to 1s. 8d. per gallon.

SOLVENT NAPHTHA is weak, and is worth about 10½d. to 11d. per gallon on rails.

HEAVY NAPHTHA is also worth about the same figure.

NAPHTHALENES are unchanged from last week, the low qualities being quoted at about £7 to £7 10s. per ton, 74/76 melting point at £8 to £8 10s. per ton on rails, and 76/78 quality is quoted at £9 to £9 10s. per ton.

PITCH is very dull. Prices are more or less nominal, but still show a tendency towards lower levels.

Sulphate of Ammonia

There are no new features to report.

Hamburg Chemical Market

QUOTATIONS in the Hamburg chemical market, according to report forwarded by Schütz and Co., are nearly all made in sterling, although occasionally in American dollars, French francs or Dutch florins. The mark, which had a place in the price lists only a short while ago has now completely disappeared. The firm supplying the report state that all orders must be covered by cheque or bankers' credit at Hamburg, owing to the need of their whole capital to keep business going.

Current Market Prices

General Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride, 90–95%	lb.	0	1	4	to	0	1	5
Acetone oil	ton	80	0	0	to	85	0	0
Acetone, pure	ton	125	0	0	to	126	0	0
Acid, Acetic, glacial, 99–100%	ton	73	0	0	to	74	0	0
Acetic, 80% pure	ton	52	0	0	to	53	0	0
Acetic, 40% pure	ton	27	0	0	to	28	0	0
Arsenic, liquid, 2000 s.g.	ton	85	0	0	to	88	0	0
Boric, commercial	ton	48	0	0	to	52	0	0
Carbolic, cryst. 39–40%	lb.	0	0	11½	to	0	1	0
Citric	lb.	0	1	5	to	0	1	5½
Formic, 85%	ton	65	0	0	to	68	0	0
Hydrofluoric	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol.	ton	39	0	0	to	40	0	0
Lactic, 60 vol.	ton	45	0	0	to	47	0	0
Nitric, 80 Tw.	ton	23	0	0	to	25	0	0
Oxalic	lb.	0	0	5¾	to	0	0	6
Phosphoric, 1.5	ton	35	0	0	to	38	0	0
Pyrogallic, cryst.	lb.	0	5	9	to	0	6	0
Salicylic, technical	lb.	0	1	9½	to	0	2	0
Sulphuric, 92–93%	ton	6	0	0	to	7	0	0
Tannic, commercial	lb.	0	2	3	to	0	2	9
Tartaric	lb.	0	1	0½	to	0	1	1
Alum, lump	ton	12	10	0	to	13	0	0
Chrome	ton	23	0	0	to	24	0	0
Alumino ferric	ton	7	0	0	to	7	5	0
Aluminium, sulphate, 14–15%	ton	8	10	0	to	9	0	0
Sulphate, 17–18%	ton	10	10	0	to	11	0	0
Ammonia, anhydrous	lb.	0	1	6	to	0	1	8
.880	ton	32	0	0	to	34	0	0
.920	ton	22	0	0	to	24	0	0
Carbonate	ton	30	0	0	to	32	0	0
Chloride	ton	50	0	0	to	55	0	0
Muriate (galvanisers)	ton	32	0	0	to	33	0	0
Nitrate (pure)	ton	40	0	0	to	45	0	0
Phosphate	ton	63	0	0	to	65	0	0
Sulphocyanide, commercial 90%	lb.	0	1	1	to	0	1	3
Amyl acetate, technical	ton	280	0	0	to	300	0	0
Arsenic, white powdered	ton	66	0	0	to	68	0	0
Barium, carbonate, Witherite	ton	5	0	0	to	6	0	0
Carbonate, Precip.	ton	15	0	0	to	16	0	0
Chlorate	ton	65	0	0	to	70	0	0
Chloride	ton	14	10	0	to	15	0	0
Nitrate	ton	33	0	0	to	35	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	0	11	to	0	1	0
Bleaching powder, 35–37%	ton	10	0	0	to	10	10	0
Borax crystals, commercial	ton	25	0	0	to		—	
Calcium acetate, Brown	ton	13	0	0	to	14	0	0
Grey	ton	22	0	0	to	23	0	0
Carbide	ton	13	0	0	to	13	10	0
Chloride	ton	5	15	0	to	6	0	0
Carbon bisulphide	ton	35	0	0	to	40	0	0
Casein technical	ton	80	0	0	to	90	0	0
Cerium oxalate	lb.	0	3	0	to	0	3	6
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb.	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	1	to	0	1	2
Sulphate	ton	25	0	0	to	25	10	0
Cream Tartar, 98–100%	ton	86	0	0	to	88	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol.	ton	63	0	0	to	64	0	0
Formusol (Rongalite)	lb.	0	1	11	to	0	2	0
Glauber salts, commercial	ton	4	0	0	to	4	10	0
Glycerin crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.	gal	0	2	0	to	0	2	1
Iron perchloride	ton	20	0	0	to	22	0	0
Sulphate (Copperas)	ton	3	10	0	to	4	0	0
Lead acetate, white	ton	46	0	0	to	48	0	0
Carbonate (White Lead)	ton	50	0	0	to	52	0	0
Nitrate	ton	44	10	0	to	45	0	0
Litharge	ton	37	0	0	to	39	0	0
Lithophone, 30%	ton	22	10	0	to	23	0	0
Magnesium chloride	ton	3	10	0	to	3	15	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	5	15	0	to	6	0	0
Sulphate (Druggists')	ton	8	0	0	to	9	0	0
Manganese Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	45	0	0	to	48	0	0
Methyl acetone	ton	82	0	0	to	85	0	0
Alcohol, 1% acetone	ton	80	0	0	to	85	0	0
Nickel sulphate, single salt	ton	37	0	0	to	38	0	0
Ammonium sulphate, double salt	ton	37	0	0	to	38	0	0
Potash, Caustic	ton	33	0	0	to	34	0	0
Potassium bichromate	lb.	0	0	5¾	to		—	
Carbonate, 90%	ton	30	0	0	to	31	0	0
Chloride, 80%	ton	9	0	0	to	10	0	0
Chlorate	lb.	0	0	3½	to		—	
Metabisulphite, 50–52%	ton	63	0	0	to	65	0	0
Nitrate, refined	ton	38	0	0	to	40	0	0
Permanganate	lb.	0	0	10	to	0	0	10½
Prussiate, red	lb.	0	2	6	to	0	2	8
Prussiate, yellow	lb.	0	0	9½	to	0	0	10
Sulphate, 90%	ton	10	0	0	to	10	10	0
Salammoniac, firsts	cwt.	2	15	0	to		—	
Seconds	cwt.	2	17	6	to		—	
Sodium acetate	ton	25	0	0	to	25	10	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	4½	to		—	
Bisulphite, 60–62%	ton	21	0	0	to	23	0	0
Chlorate	lb.	0	0	2¾	to	0	0	3
Caustic, 70%	ton	17	10	0	to	18	0	0
Caustic, 76%	ton	18	10	0	to	19	0	0
Hydrosulphite, powder	lb.	0	1	6	to	0	1	7
Hyposulphite, commercial	ton	10	10	0	to	11	0	0
Nitrite, 96–98%	ton	31	0	0	to	32	0	0
Phosphate, crystal	ton	16	0	0	to	16	10	0
Perborate	lb.	0	0	11	to	0	1	0
Prussiate	lb.	0	0	6	to		—	
Sulphide, crystals	ton	8	10	0	to	9	0	0
Sulphide, solid, 60–62 %	ton	15	0	0	to	16	10	0
Sulphite, cryst.	ton	11	10	0	to	12	0	0
Strontium carbonate	ton	50	0	0	to	55	0	0
Nitrate	ton	50	0	0	to	55	0	0
Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Flowers	ton	11	0	0	to	11	10	0
Roll	ton	9	15	0	to	10	10	0
Tartar emetic	lb.	0	1	0	to	0	1	1
Tin perchloride, 33%	lb.	0	1	1	to	0	1	2
Perchloride, solid	lb.	0	1	3	to	0	1	4
Protochloride (tin crystals)	lb.	0	1	4	to	0	1	5
Zinc chloride 102° Tw.	ton	20	0	0	to	21	0	0
Chloride, solid, 96–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	42	0	0	to	45	0	0
Dust, 90%	ton	50	0	0	to	55	0	0
Sulphate	ton	15	0	0	to	16	0	0

Pharmaceutical Chemicals

Acetyl salicylic acid	lb.	0	3	9	to	0	4	0
Acetanilid	lb.	0	3	0	to	0	3	3
Acid, Gallic, pure	lb.	0	3	0	to	0	3	3
Lactic, 1.21	lb.	0	2	10	to	0	3	3
Salicylic, B.P.	lb.	0	2	5	to	0	2	7
Tannic, leviss	lb.	0	3	2	to	0	3	4
Amidol	lb.	0	7	6	to	0	8	0
Amidopyrin	lb.	0	14	0	to	0	14	6
Ammon ichthosulphonate	lb	0	1	10	to	0	2	0
Barbitone	lb.	0	17	0	to	0	17	6
Beta naphthol resublimed	lb.	0	3	0	to	0	3	6
Bromide of ammonia	lb.	0	0	10½	to	0	1	0
Potash	lb.	0	0	8½	to	0	0	9
Soda	lb.	0	0	9¼	to	0	0	10½
Caffeine, pure	lb.	0	12	3	to	0	12	9
Calcium glycerophosphate	lb.	0	5	9	to	0	6	0
Lactate	lb.	0	2	0	to	0	2	3
Calomel	lb.	0	3	9	to	0	4	0
Chloral hydrate	lb.	0	4	1½	to	0	4	3
Cocaine alkaloid	oz.	1	2	0	to	1	2	6
Hydrochloride	oz.	0	17	0	to	0	17	6
Corrosive sublimate	lb.	0	3	3	to	0	3	6
Eucalyptus oil, B.P. (70–75% eucalyptol)	lb.	0	2	4	to	0	2	6
B.P. (75–80% eucalyptol)	lb.	0	2	5	to	0	2	7
Guaiacol carbonate	lb.	0	13	3	to	0	13	6
Liquid	lb.	0	11	6	to	0	12	0
Pure crystals	lb.	0	12	6	to	0	13	0
Hexamine	lb.	0	4	3	to	0	4	6
Hydroquinone	lb.	0	4	3	to	0	4	6
Lanoline anhydrous	lb.	0	0	7	to	0	0	6
Lecithin ex ovo	lb.	1	5	0	to	1	7	6
Lithi carbonate	lb.	0	10	0	to	0	10	6
Methyl salicylate	lb.	0	3	0	to	0	3	6
Metol	lb.	0	9	0	to	0	10	0
Milk sugar	cwt.	4	5	0	to	4	10	0
Paraldehyde	lb.	0	1	7	to	0	1	9
Phenacetin	lb.	0	7	6	to	0	8	0
Phenazone	lb.	0	8	3	to	0	8	6
Phenolphthalein	lb.	0	8	0	to	0	8	3
Potassium sulpho guaiacolate	lb.	0	7	3	to	0	7	9
Quinine sulphate, B.P.	oz.	0	2	3	to		—	

	Per	£	s.	d.		£	s.	d.
Resorcin, medicinal	lb.	0	6	3	to	0	6	6
Salicylate of soda powder	lb.	0	3	0	to	0	3	3
Crystals	lb.	0	3	0	to	0	3	3
Salol	lb.	0	4	0	to	0	4	3
Soda Benzoate	lb.	0	3	6	to	0	3	9
Sulphonal	lb.	0	17	0	to	0	18	0
Terpene hydrate	lb.	0	1	9	to	0	2	0
Theobromine, pure	lb.	0	12	0	to	0	12	3
Soda salicylate	lb	0	8	6	to	0	9	0
Vanillin	lb.	1	4	6	to	1	5	6

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	1	9	to	0	2	0
Refined	lb.	0	2	3	to	0	2	6
Alphanaphthylamine	lb.	0	1	6½	to	0	1	7
Aniline oil, drums extra	lb.	0	0	8½	to	0	0	8¾
Salts	lb.	0	0	9	to	0	0	9½
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	2	9	to	0	3	0
Benzidine, base	lb.	0	4	6	to	0	4	9
Sulphate	lb.	0	3	6	to	0	3	9
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol	lb.	0	1	1	to	0	1	2
Betanaphthylamine, technical	lb.	0	4	0	to	0	4	3
Crocein Acid, 100% basis	lb.	0	3	3	to	0	3	6
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	4	6	to	0	4	9
Dinitrobenzol	lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol	lb.	0	0	11	to	0	1	0
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	3	to	0	1	4
Dinitrophenol	lb.	0	1	6	to	0	1	7
Dimethylaniline	lb.	0	2	8	to	0	2	10
Diphenylamine	lb.	0	3	3	to	0	3	6
H-Acid	lb.	0	4	6	to	0	4	9
Metaphenylenediamine	lb.	0	4	0	to	0	4	3
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	5	9	to	0	6	0
Metatoluylenediamine	lb.	0	4	0	to	0	4	3
Monosulphonic Acid (2.7)	lb.	0	8	6	to	0	9	6
Naphthionic acid, crude	lb.	0	2	4	to	0	2	6
Naphthionate of Soda	lb.	0	2	4	to	0	2	6
Naphthylamine-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Neville Winther Acid	lb.	0	7	3	to	0	7	9
Nitrobenzol	lb.	0	0	7	to	0	0	8
Nitronaphthalene	lb.	0	0	11½	to	0	1	0
Nitrotoluol	lb.	0	0	8	to	0	0	9
Orthoamidophenol base	lb.	0	12	0	to	0	12	6
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	0	10	to	0	0	11
Orthonitrotoluol	lb.	0	0	3	to	0	0	4
Para-amidophenol, base	lb.	0	8	6	to	0	9	0
Hydrochlor	lb.	0	7	6	to	0	8	0
Paradichlorbenzol	lb.	0	0	9	to	0	0	10
Paranitraniline	lb.	0	2	7	to	0	2	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	2	9	to	0	3	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	12	6
Paratoluidine	lb.	0	5	6	to	0	5	9
Phthalic anhydride	lb.	0	2	6	to	0	2	9
Resorcin, technical	lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude	lb.	0	0	9	to	0	0	10
Tolidine, base	lb.	0	7	3	to	0	7	9
Mixture	lb.	0	2	6	to	0	2	9

Essential Oils and Synthetics

Essential Oils.		£	s.	d.
Anise	c.i.f. 1/9 spot	0	1	10
Bay		0	12	0
Bergamot		0	14	3
Cajuput		0	3	3
Camphor, white	per cwt.	4	0	0
Brown	"	3	15	0
Cassia	c.i.f. 5/6 spot	0	8	0
Cedarwood		0	1	6
Citronella (Ceylon)	easier c.i.f. 3/2 spot	0	3	8
(Java)	firm c.i.f. 4/4 spot	0	4	7
Clove		0	9	6
Eucalyptus		0	2	4
Geranium Bourbon		1	16	0
Lavender		1	6	0
Lavender Spike		0	4	3
Lemon		0	3	0
Lemongrass	per oz.	0	0	2¾

		£	s.	d.
Lime (distilled)		0	4	3
Orange sweet (Sicilian)		0	11	6
(West Indian)		0	9	6
Palmarosa		0	18	0
Peppermint (American)		0	16	0
Mint (dementholised Japanese)		0	14	0
Patchouli		1	5	0
Otto of Rose	per oz.	1	15	0
Rosemary		0	1	11
Sandalwood		1	5	0
Sassafras		0	9	9
Thyme	2/6 to	0	8	0

Synthetics.		£	s.	d.
Benzyl acetate	per lb.	0	3	3
Benzoate	"	0	3	6
Citral	"	0	10	0
Coumarine	"	1	0	0
Heliotropine	"	0	8	0
Ionone	"	1	5	0
Linalyl acetate	"	1	2	6
Methyl salicylate	"	0	3	0
Musk xylol	"	0	18	0
Terpeniol	"	0	2	9

Molecular Attraction: Relation to Engineering

AT a special meeting of the Junior Institution of Engineers on Friday, January 25, Professor Edwin Edser delivered a lecture on "Molecular Attraction and its Relation to Engineering." The lecture was illustrated throughout by a number of interesting experiments, slides and sketches, and dealt in a practical manner with engineering methods and problems which are based on principles of molecular attraction.

Professor Edser explained how liquids have tensile strength just as much as solids, and demonstrated by sketches the nature of surface tension and capillary attraction. Capillary attraction was the cause of water permeating brick walls, although this could be avoided by a coating of some waxy substance, and in order to render road surfaces waterproof they were in many cases treated with emulsified tar. The amount of energy which was brought into play by molecular attraction was not always realised, but two experiments showed that the rate at which a minute film of oil would spread over water and even along the interface of two different liquids such as water and paraffin was conclusive that excessively high pressures must be present. The oil used in the experiments was oleic acid, which is of a viscous nature and could not go at such a speed through so small a space unless it were under very high pressure.

The lecturer referred to the discovery during the building of the Nile dam of a monolith similar to Cleopatra's Needle. This monolith was found only partially cut from the rock, and apparently it was being severed by making a line of holes and plugging them with wood. By wetting the wood great pressures were produced, which eventually made a crack in the required place. The rubbing of particular surfaces together might cause unlooked-for results, but every engineer now knew that a brass shaft would not work in a brass bearing unless it was given particular attention in the way of lubrication. On the other hand, metal surface plates could be made by burnishing with a suitable material, and a razor blade could be sharpened by passing it between two steel balls and applying the right amount of pressure.

In answer to questions raised during the discussion, Professor Edser explained why oil could calm the waves, how paraffin removes rust, and the part that a flux takes in soldering operations.

Magadi Soda Co.

A MEETING of shareholders of the Magadi Soda Co. called to pass a resolution to wind the company up voluntarily with the object of reorganisation resulted in a deadlock, the scheme being opposed by Mr. A. P. Pennell, who had received sufficient proxies to block the board's scheme. A proposal that Mr. Pennell should be appointed joint liquidator with Mr. A. W. Tait was lost on a show of hands, and a poll was demanded. The result was declared on Tuesday, and showed 304,753 votes in favour of the amendment appointing Mr. A. P. Pennell joint liquidator, with Mr. Tait, while the number of votes against was 227,566. As a three-fourths majority is necessary the amendment was thus not carried.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, January 31, 1924.

THE past week brought a fair number of inquiries, but owing to the railway strike delivery has been very uncertain, although not altogether held up.

Limited quantities of continental products continue to be received, and in some cases business can be negotiated on the old terms of payment.

Prices on the whole are steady.

Industrial Chemicals

ACID ACETIC.—Glacial, 98/100%, £60 to £67 per ton; 80% pure, £49 to £51 per ton; 80% technical, £47 to £48 per ton, all packed in casks, delivered c.i.f. U.K. ports, duty free.

ACID BORACIC.—Crystals or granulated, £48 per ton; powdered, £50 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—Now quoted 9½d. per lb., carriage paid, but in very little demand.

ACID CITRIC B.P. CRYSTALS.—Unchanged at about 1s. 4½d. per lb., less 5% ex store.

ACID FORMIC 85%.—Spot material very scarce, but could probably be obtained at round about £64 per ton, ex store.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC 80°.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC.—Price about 5½d. per lb., ex store, but little inquiry.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168° £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Unchanged at about 1s. per lb., less 5% ex wharf.

ALUMINA SULPHATE 17/18% IRON FREE.—Spot lots quoted £8 10s. per ton, ex store. Offered for forward delivery at about £7 10s. per ton, c.i.f. U.K. port.

ALUM, CHROME.—Price unchanged at £26 to £28 per ton, according to quality, delivered f.o.b. U.K. port.

ALUM POTASH (LUMP).—Quoted £10 17s. 6d. per ton, f.o.b. U.K. port for export. Continental material on offer at about the same price, ex store.

AMMONIA.—Anhydrous.—Unchanged at about 1s. 5d. per lb., ex station, prompt delivery.

AMMONIA CARBONATE.—Lump, £35 per ton; powdered, £37 per ton packed in casks carriage paid U.K. station.

AMMONIA, LIQUID 880°.—Unchanged at 3d. per lb. delivered, containers extra.

AMMONIA MURIATE.—Grey galvanisers quality offered at £31 to £32 per ton, ex station, spot delivery. Fine white crystals quoted £27 15s. per ton, ex store.

ARSENIC, WHITE POWDERED.—Unchanged at about £73 to £74 per ton, ex store, spot delivery. Slightly cheaper prices for export.

BARIUM CARBONATE.—98/100% powdered, offered from the continent at £12 10s. per ton, c.i.f. U.K. port.

BARIUM CHLORIDE 98/100%.—English material unchanged at about £15 per ton ex store. Offered from the continent at slightly less.

BARYTES.—Finest white English unchanged at £5 5s. per ton, ex works. Good quality continental material offered at £5 per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—Spot lots £11 per ton, ex station. Contracts 20s. per ton less.

BORAX.—Granulated, £24 10s. per ton; crystal, £25 per ton; powdered, £26 per ton; carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s. 6d. per ton, ex station. Offered from the continent at about £4 15s. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—Good export inquiry. Price about £3 10s. per ton, f.o.b. U.K. port, packed in casks.

COPPER SULPHATE.—In little demand. Price about £25 per ton, less 5 per cent. f.o.b. U.K. port.

FORMALDEHYDE 40%.—Moderate inquiry. Quoted £62 15s. per ton, ex store, spot delivery.

GLAUBER SALTS.—English material £4 per ton, ex store or station. Continental offering at about £3 5s. per ton, c.i.f. U.K. port.

LEAD, RED.—English makers' price nominally £46 10s. per ton, carriage paid U.K. station, but parcels can be obtained at considerably less. Continental prices now advanced to about £38 10s. per ton, c.i.f. U.K. port. Spot lots quoted at about the same figure, ex store.

LEAD, WHITE.—Continental material on offer at about £41 per ton, ex store.

LEAD, ACETATE, WHITE CRYSTALS.—Little spot material available. Price about £47 to £48 per ton, ex store. Offered from the continent at £46 15s. per ton, c.i.f. U.K. port.

MAGNESITE, CALCINED.—Finest English material offered at £8 per ton, ex station.

MAGNESIUM CHLORIDE.—Spot material still available at about £4 per ton, ex store. Offered from the continent at about £3 10s. per ton, c.i.f. U.K. port, prompt shipment.

MAGNESIUM SULPHATE (EPSOM SALTS).—Commercial quality offered at about £5 per ton ex store. B.P. quality £6 5s. per ton, ex station, prompt delivery.

POTASH, CAUSTIC, 88/92%.—Little spot material available. Price about £32 to £33 per ton ex store. Offered from the continent at about £29 15s. per ton, c.i.f. U.K. port.

POTASSIUM BICHROMATE.—Unchanged at 5¾d. per lb., delivered.

POTASSIUM CARBONATE, 96/98%.—Spot material now offered at £28 per ton, ex store. Continental offers lower, now quoted about £25 10s. per ton, c.i.f. U.K. port.

POTASSIUM CHLORATE.—Little inquiry. Spot lots unchanged at about 3½d. per lb., ex store.

POTASSIUM NITRATE (SALTPETRE).—Quoted £32 10s. per ton, ex store. Spot delivery. Offered from the continent at about £24 5s. per ton, c.i.f. U.K. port.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Quoted 10¼d. per lb., ex store, spot delivery. In little demand.

POTASSIUM PRUSSIATE (YELLOW).—Quoted 9¼d. per lb. f.o.b. U.K. port for export. Spot material on offer at 9¾d. per lb., ex station.

SODA CAUSTIC.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62%, broken, £19 2s. 6d. per ton; 98/99% powdered, £22 15s. per ton. All ex station, spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—Spot lots quoted about £24 per ton, ex store. Offered for early delivery at about £23 10s. per ton, ex wharf.

SODIUM BICARBONATE.—Refined recrystallised quality £10 10s. per ton ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—English makers' price unchanged at 4½d. per lb., delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station. Alkali 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English makers' price about £10 per ton, ex station. Continental obtainable at about the same figure. Pea crystals quoted £15 per ton, ex store.

SODIUM NITRITE 100%.—Quoted £26 10s. to £28 10s. per ton according to quantity, f.o.b. U.K. port.

SODIUM PRUSSIATE (YELLOW).—Unchanged at about 5d. per lb., f.o.b. U.K. port for export. Spot material available at about 5¼d. per lb., ex store.

SODIUM SULPHATE (SALTCAKE).—Price for home consumption £4 5s. per ton, carriage paid stations. Good export inquiry.

SODIUM SULPHIDE 60/62%.—Solid, £15 per ton, ex station. Broken, £1 per ton more. 31/34% crystals, £9 7s. 6d. per ton, ex station.

SULPHUR.—Flowers, £10 per ton; roll, £9 per ton; rock, £9 per ton; ground, £8 per ton. Prices nominal.
TIN CRYSTALS.—Quoted 1s. 3½d. per lb., f.o.b. U.K. port.
ZINC CHLORIDE 98/100%.—Unchanged at about £25 per ton, f.o.b. U.K. port.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ALPHA NAPHTHYLAMINE.—Some home inquiries. Price 1s. 4½d. lb., delivered.
BENZOIC ACID.—Supplies are offered at 1s, 9d. lb., delivered.
BETA OXY NAPHTHOIC ACID.—Small export inquiry. Price 9s. 6d. lb., f.o.b., casks included.
ETHYL BENZYL ANILINE.—Small home inquiry. Price quoted 6s. 6d. lb., delivered.
NAPHTHIONATE OF SODA.—Steady demand. Price 2s. 7d. lb., 100% basis.
NITRO DICHLORBENZOL.—Some home inquiry. Price 1s. lb., delivered.
PICRAMIC ACID.—Home inquiry. Price 2s. 5d. lb., 100% basis delivered.
PARA NITROTOLUOL.—Export inquiry. Price quoted 2s. 3d. lb., f.o.b.
PARA NITRANILINE.—Good home demand. Price 2s. 4½d. lb., delivered.
TOBIAS ACID.—Some home demand. Price 5s. 8d. lb., 100% basis, delivered.

Chemical Matters in Parliament

Imports of Foreign Dyestuffs

IN reply to a question by Lieut.-Commander Kenworthy (House of Commons, January 22) respecting the quantities and value of foreign dyes and dyestuffs imported into the United Kingdom since January 1, 1923, Lord Wolmer, Parliamentary Secretary to the Board of Trade, supplied the following statement for the twelve months ended December 31, 1923.

Article.	Quantity. Cwt.	Value. £
Dyes and Dyestuffs (except Dye Woods and Raw Dyeing Substances) and Extracts for Dyeing and Tanning :—		
Intermediate Coal Tar Products used in the Manufacture of Dyes (including Aniline Oil and Salt, and Phenyl-glycine)	1,349	17,010
Finished Dyestuffs obtained from Coal Tar :—		
Alizarine	8,409	72,761
Indigo, Synthetic	8,274	13,243
Other sorts	39,474	917,721
Extracts for Dyeing :—		
Cutch	48,395	69,475
All other sorts	72,904	310,852
Indigo, Natural	757	26,915

Explosion in Nitrogen Fixation Plant

Heavy Damage at a German Works.

A VIOLENT explosion, recalling that at Oppau in September, 1921, is reported from Germany. This occurred on Friday, January 25, at the Leuna Works, a large organisation of chemical and other factories near Merseburg, south of Halle. In the department where ammonia products were manufactured a high-pressure container blew up with great force, two workmen being killed outright and a number of others severely injured. Of the latter, it is known that four, including the engineer, have since died, and others are not expected to live. Later reports, still unconfirmed, give the number killed as 15.

According to the descriptions of eye-witnesses, whole buildings collapsed like cardboard under the force of the explosion. The cause of the disaster is not clear. The Leuna Works, which came into existence during the war for the fixation of atmospheric nitrogen and the manufacture of ammonia and nitrate compounds for high explosives, had been turned over to the production of artificial manures. The reports (which, however, betray an unfamiliarity with the process) state that gauges on the container showed the presence of 5 per cent. of carbon dioxide instead of a normal 3 per cent. When this was confirmed by analyses the management, fearing to alarm the workpeople, allowed it to be stated that the gauges were out of order. Shortly afterwards an attempt was made to open escape valves, when the explosion occurred.

The Manchester Chemical Market

(FROM OUR OWN CORRESPONDENT.)

Manchester, January 31, 1924.

VALUES have been steadier on the chemical market here during the past week and few concessions of importance have been made. Business, however, has been only on a relatively small scale, buyers, as before, restricting their operations very largely to immediate needs. With the railway trouble settled, and one retarding influence out of the way, it is probable that a return of buying interest will show itself. On the export side actual business has been on quietly steady lines, although a fair number of inquiries have been reported.

Heavy Chemicals

Glauber salts still attract little attention, but at £3 10s. per ton values are maintained at recent levels. Bicarbonate of soda is also only in moderate demand at the moment, with prices steady at £10 10s. per ton. Saltcake is unchanged at round £4 10s. per ton; foreign inquiry is pretty good with home requirements on a fair scale. Caustic soda is in steady request at from £16 17s. 6d. per ton for 60 per cent. material to £19 7s. 6d. for 76-77 per cent. for the home trade, with lower values for shipment. Hyposulphite of soda continues dull and inactive, although prices are held at about £15 per ton for photographic crystals and £10 for commercial. Prussiates of soda are likewise featureless and no improvement in buying interest can be reported; to-day's value is on the easy side at 5¼d. to 5½d. per lb. Not much demand is being received for sulphide of sodium, prices, however, being unchanged at £14 10s. to £15 per ton for 60-65 per cent. concentrated and round £9 per ton for crystals. Nitrite of soda keeps steady and in rather short supply at £28 to £28 10s. per ton. Bichromate of soda meets with a fairly active demand at 4½d. per lb. A steady inquiry for soda crystals is reported at £5 5s. per ton. Phosphate of soda values are about unchanged from last week at £14 per ton, but the demand continues on small lines. Bleaching powder is quiet just now, with price steady at £10 per ton. Chlorate of soda is inactive, although quotations are steadier at 2¾d. per lb. Acetate of soda is firmly maintained at £23 per ton. Alkali is offering at about £7 per ton for 58 per cent. material, a fair amount of business being put through.

Prices for caustic potash and carbonate of potash continue firm, caustic being quoted at £30 to £32 per ton for 90 per cent. strength and carbonate at about £28 for 88-92 per cent. Chlorate of potash is only a quiet section, and quotations are on the easy side at 2¾d. to 3d. per lb. Bichromate of potash is held at 5¾d. per lb., a fair demand being met with. Yellow prussiate of potash is inactive at 8½d. per lb. Permanganate of potash is dull and weak at 8d. to 9d. per lb., according to quality.

The demand for arsenic keeps moderate, with white powdered, Cornish makes, offering at round £66 per ton. The export inquiry for sulphate of copper is restricted, with values about unchanged from last week at £25 10s. per ton, f.o.b. Acetate of lead is in quietly steady request, with values very firm at from £45 to £46 per ton both for white and brown qualities. Acetate of lime meets with a rather good demand, and as prompt supplies are on the short side prices are maintained at £21 to £22 for grey and £14 10s. per ton for brown. Nitrate of lead is steady at £42 to £43 per ton. Commerical Epsom salts are unchanged at £4 10s. per ton; magnesium sulphate, B.P., is quoted at £6 5s. to £6 10s.

Acids and Tar Products

Tartaric and citric acids are quiet sections of the market, the former offering at 1s. 1¼d. per lb. and citric at 1s. 4½d. Oxalic acid is dull, but about unchanged at 5½d. per lb. Acetic acid is well maintained on a rather active inquiry; commercial, 80 per cent. quality, is quoted at £47 per ton and glacial at £65 to £70.

Export inquiry for pitch shows little indication of improvement and quotations are easy at round £4 per ton. Carbolic acid is quiet, although available supplies are small; crude is quoted at 2s. 3d. per gallon and crystals at 9½d. to 10d. per lb. Naphthalenes are being offered at £18 per ton for refined and £6 to £10 per ton for crude. Solvent naphtha is quoted at 1s. 1d. to 1s. 2d. per gallon, but the demand for this material is still subdued. Creosote oil is in steady inquiry at 9d. to 9½d. per gallon.

Company News

CONSETT SPANISH ORE.—An interim dividend of 1s. per share is payable on February 15.

ENGLISH CHINA CLAYS, LTD.—A dividend is announced on the preference shares at the rate of 7 per cent. per annum for the half-year ended December 31, to be paid on February 1.

MIAMI COPPER CO.—A dividend of 50 cents per share on the capital stock, for the quarter ending December 31 last, is announced, payable on February 15.

MOND NICKEL CO.—An interim dividend of 5 per cent. on the ordinary shares, less tax, is announced, payable on March 3. A year ago an interim dividend of 2½ per cent. was declared, tax free.

CELLULOSE HOLDINGS AND INVESTMENT CO.—The directors announce a dividend of £3 14s. 4d. per cent. on the old issue of the 7 per cent. participating debenture stock and £3 10s. 4d. per cent. on the new issue, payable, less tax, on February 1.

RHODESIAN KING ASBESTOS CO., LTD.—At an extraordinary general meeting, held in London on Monday, a resolution was passed approving of the sale of the undertaking to the Rhodesian and General Asbestos Corporation, Ltd.

BROKEN HILL SOUTH.—According to a cable from Melbourne, dated January 25, the estimated surplus for the half-year to December 31 amounts to £197,000, after allowance for taxation, allowance for depreciation of plant, provision for new plant, and redemption of debentures.

CHINO COPPER CO.—A special meeting of stockholders is to be held at Portland, Maine, on February 15, to consider the sale of the undertaking to Ray Consolidated Copper Co. on terms which will give 1⅜ shares of Ray Consolidated Co. for each share of Chino Copper Co.

COMMERCIAL GAS CO.—The directors recommend dividends for the half-year to December last at the rates of 6 per cent. per annum on the 4 per cent. and 6 per cent. per annum on the 3½ per cent. stocks. Dividends were at the same rates for the first half of the year, and compare with an average of £5 16s. per cent. and £5 15s. per cent. respectively for 1922.

BORAX CONSOLIDATED, LTD.—The directors have decided to recommend to the shareholders the payment of a final dividend of 1s. 6d. per share (7½ per cent.) and a bonus of 6d. per share (2½ per cent.), less tax at 4s. 9d. in the £, on the deferred ordinary shares, making 15 per cent. for the year to September 30 last. For the preceding year the dividend was 12½ per cent., with no bonus.

BRITISH OIL AND CAKE MILLS, LTD.—The directors have decided to pay a final dividend on March 3 next of 2½ per cent. (less tax) on the ordinary shares, which, with the interim dividend paid in September last, makes a total of 7½ per cent., less tax, for the year. It is hoped that the accounts will be in the hands of the shareholders by the end of April. A year ago the final dividend was 5 per cent., making 10 per cent. for the year 1922.

ENGLISH VELVET AND CORD DYERS' ASSOCIATION.—The net profits for the year 1923 amounted to £65,218, in comparison with £75,749 for 1922. The latter figure, however, included a surplus of £14,658 on investments realised, whereas in 1923 there was a loss of £492 on investment sales. The balance brought forward was £36,035 and the interim dividend absorbed £18,551, the balance now available being £82,903. The proposed final dividend on the ordinary shares is 7 per cent. actual, making 10 per cent. for the year, less tax (against 8 per cent.). The allocation to reserve is unchanged at £10,000, but only £5,000 is placed to employees' benefit fund (against £10,000), while £32,147 is carried forward.

GAS LIGHT AND COKE CO.—The accounts for the year 1923 disclose a profit of £1,378,811 (against £1,552,102 for 1922). The balance brought in was £244,355, the net revenue account showing a total of £1,623,166. After deducting debenture and other interest, the dividends for the June half-year on the preference maximum and ordinary stocks, and placing £20,000 (the same) to redemption fund, there is an available balance of £825,123. It is proposed to pay, in addition to the fixed dividends on the preference and maximum stocks, a dividend for the latter half of the year on the ordinary stock at the rate of £5 6s. 8d. per cent. per annum (making £5 5s. 4d. per cent. actual for the year, against £5 4s. per cent. for 1922). After carrying £11,002 to reserve (against £22,061), and contributing a further £20,000 to the redemption fund (the same), a balance of £227,295 is carried forward.

BENZOL AND BY-PRODUCTS, LTD.—At the annual general meeting, held in London on Thursday, January 24, Sir H. O. Bax-Ironside, who presided, said, said that trading since September 30 had continued to show a progressive increase. The tar distillery was for the first time in the Company's record working at almost full capacity, advantageous raw material contracts having been effected covering the period of 1924. Overtime winding had commenced at the colliery in December, thereby increasing output, and when he said that the December monthly revenue was the largest in the company's history the shareholders would appreciate the benefit of the economies to which the Board of Management had for so long devoted their attention. It had been decided further to increase the colliery output to a very considerable extent by widening a spare shaft, and immediate steps had been taken to put the work in hand. The company's by-products were well sold for several months ahead. The directors had in contemplation the payment, at an early date, of an interim dividend on the preference shares in excess of the fixed half-yearly dividend of 3 per cent., and of which notification would be made to the shareholders in due course.

Tariff Changes

ARGENTINE REPUBLIC.—Under a new Customs tariff an import duty of 10 per cent. *ad valorem* is charged on the following:—Citric and tartaric acids, sulphate of lime. A duty of 5 per cent. is charged on heavy tar oils; mercury; crude sulphur in lumps; impure bisulphite of soda; ordinary tanning extracts, from 25 to 30° Baumé; gelatine for the preparation of preserved meats; crude nitrate of potash; zinc oxide; oxide of iron; resin pitch; soda, carbonate, ash, industrial silicate, nitrate, and sulphate of soda, caustic soda; impure sulphate of aluminium; copper sulphate; barium sulphate; aniline dyes; acetic acid; formic acid; bichromate of potash; chloride and hypochlorite of lime; schist oil, imported solely by gas companies for the carburation of illuminating gas; kaolin. Zinc oxide, sesquisulphide of phosphorous, sulphide of baryta, and fertilisers are free of import duty.

BRITISH INDIA.—The new import tariff given in THE CHEMICAL AGE of July 14, 1923, has now been introduced. The full tariff was published in the *Board of Trade Journal* of January 24.

CANADA.—Acetate of lime has been added to the list of chemicals which may be imported free.

FINLAND.—The import duties on the following chemicals have been reduced: Vegetable fatty oils, graphite, ethyl ether, caustic soda, and chloride of lime. Common salt is now admitted free.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

DEMAND FOR PALM OIL SOAP IN EGYPT.—The Egyptian War Department are calling for tenders for palm oil soap. Tenders are due on March 3, 1924, and to remain open for seven days. Particulars can be obtained from The Inspecting Engineer, Egyptian and Sudan Governments, Queen Anne's Chambers, London, S.W.1. (Reference Muh. 1924/27/8.)

CHEMICALS FOR SOAP AND GLASS MAKING REQUIRED IN ROUMANIA.—A firm in Czernowitz, Roumania, desire to communicate with United Kingdom suppliers of chemicals used in the manufacture of soft soap and glass, for which they desire to obtain an agency for the greater portion of Roumania. They also desire to import pharmaceutical products which they would introduce in Roumania. (Reference No. 129.)

"Chemical Age" Inquiry List

The following inquiries have been received from readers of "The Chemical Age." Replies addressed to the box number given below, c/o "The Chemical Age," 8, Bouverie Street, London, E.C.4, will be forwarded to the inquirers.

MAKERS OF WOODEN FILTER PRESS TAPS.—H.35.

MAKER OR SUPPLIER OF STEARS NAPHTHALENE SULPHONIC ACID.—Twitchells Reagent.—H.36.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

EVANS, Alfred, 20, Perry Street, Wednesbury, brewers' chemist. (C.C., 2/2/24.) £14 19s. 2d. November 30.

HALL, Harry H., Sladen Dyeworks, Littleborough, dyer and finisher. (C.C., 2/2/24.) £60 19s. 10d. December 14.

PICKWORTH, Mr. H., Wood Green, Wednesbury, veterinary surgeon. (C.C., 2/2/24.) £18 12s. 10d. December 17.

THOMPSON, R., and THOMPSON, A. V. (trading as WENNING PAINT WORKS), Bentham, paint manufacturers. (C.C., 2/2/24.) £65 13s. December 20.

WOODS, Albert Royle, 7, St. Mary Street, Manchester, dry-cleaning specialist. (C.C., 2/2/24.) £27 15s. 6d. December 10.

Receivership

AUSTIN AND SON (NECHELLS), LTD. (R., 2/2/24.) H. G. Willmot, of 147, Corporation Street, Birmingham, was appointed receiver and manager on January 2nd, 1924, under powers contained in debenture dated August 21, 1923.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

GREEN (JOHN W.) AND SONS, LTD., Morley, fat refiners. (M., 2/2/24.) Registered January 19, mortgage to bank; charged on property in Wide Lane, Morley, with plant, etc. *£1,500. August 3, 1923.

LLOYD (HOWARD) AND CO., LTD., Leicester, chemists. (M., 2/2/24.) Registered January 16, £3,400 mortgage, to J. A. Bolton, East Park Road, Leicester, hosiery manufacturer; charged on 14, 16, 18, 20 and 22, Ashfordby Street, Leicester. *£3,500. February 17, 1922.

Satisfactions

LLOYD (HOWARD) AND CO., LTD., Leicester, chemists. (M.S., 2/2/24.) Satisfactions registered January 16, £3,500, registered February 18, 1921; and £500, registered February 6, 1923.

PASTEX DYES, LTD., London, N. (M.S., 2/2/24.) Satisfaction registered January 17, £600, registered July 13, 1923.

London Gazette

Winding-Up Petition

BRITISH POTASH CO., LTD. (W.U.P., 2/2/24.) A petition for winding up has been presented, and is to be heard at the Royal Courts of Justice, Strand, London, on Tuesday, February 5.

Company Winding Up

ANGLO-BURMA OIL CO., LTD., 58, Finsbury Pavement, London, E.C.2. (C.W.U., 2/2/24.) Winding up order, January 19, 1924.

Companies Winding Up Voluntarily

AUSTIN AND SON (NECHELLS), LTD. (C.W.U.V., 2/2/24.) H. G. Willmot (Messrs. Willmot and Hardy, chartered accountants, 147, Corporation Street, Birmingham), appointed liquidator.

MALABAR OIL EXTRACTION CO., LTD. (C.W.U.V., 2/2/24.) W. Braby, 25, Victoria Street, Westminster, S.W.1, appointed liquidator. Meeting of creditors at office of liquidator on Monday, February 4, at 12 noon.

Partnerships Dissolved

BALKWILL AND CO. (Freeman William HUNT and Bernard Thomas Richardson SHELTON), pharmaceutical chemists and druggists, 106, Old Town Street, Plymouth, by mutual consent as from December 31, 1923. Debts received and paid by B. T. R. Shelton, who will continue the business.

INDUSTRIAL DYE WORKS (Albert SIDDALL, and Harry HEATHCOTE), dyers and bleachers, Industrial Dye Works, Brook Street, Macclesfield, by mutual consent as from January 3, 1924. Debts received and paid by A. Siddall.

WINDER BROS. (Harry WINDER, William WINDER, and Edward WINDER), botanical brewers, Hall Fold, Gildersome, near Leeds, by mutual consent as from November 30, 1923. Debts received or paid by H. Winder, who continues the business.

New Companies Registered

ASHTON AND MOORE (METAL COLOURERS), LTD. Registered on January 18, to carry on the business of metal colouring by a process discovered or invented by L. C. K. Ashton and C. E. Moore. Nominal capital, £1,200 in £1 shares. Solicitor: W. L. W. Newey, 13, Temple Street, Birmingham.

CHEMICAL AND POTASH CO., LTD., 24, Eastcheap, London, E.C. Manufacturers of and dearers in chemicals, industrial and other preparations and articles, compounds, cements, oils, paints, pigments and varnishes, etc. Nominal capital, £2,000 in £1 shares.

CORSITE, LTD., Richmond Chambers, Richmond Terrace, Blackburn. Drysalters and manufacturers, distillers and dealers in tar, oil, benzol, spirit and other products, etc. Nominal capital, £10,000 in £1 shares.

CRISPIN AND CO., LTD., Marshgate Lane, Stratford, E.15. Registered on January 2. Refiners of copper and other metals in all its branches. Nominal capital, £7,000.

INDUSTRIAL DYEING CO., LTD., Industrial Dyeworks, Brook Street, Macclesfield. Dyers, bleachers, makers of vitriol, bleaching, finishing and dyeing materials. Nominal capital, £1,000 in 500 6 per cent. cumulative preference and 500 ordinary shares of £1 each.

METALLURGY, LTD., 9, Dawson Street, Dublin. Registered on December 31. Importers, exporters, metallurgists, chemists, etc. Nominal capital, £5,000 in £10 shares.

N.S. PLATING CO., LTD., 86B, South End, Croydon. Manufacturing chemists, nickel, silver and zinc platers of metals, etc. Nominal capital, £100 in 1s. shares.

ROBINSON, THOMPSON AND CO., LTD., 22, Denman Street, London, S.E.1. Essential oil merchants and brokers, manufacturers, refiners, preparers and dealers in such oils and oleaginous substances, etc., manufacturing and general chemists and druggists. Nominal capital £2,000 in £1 shares.

SENSIBLE HEAT DISTILLATION, LTD. To acquire and turn to account any invention relating to the carbonisation or distillation of bitumen, coal, shale, slack, peat and other minerals, etc. Nominal capital, £35,000 in 17,500 50 per cent. preference shares of £1 and 350,000 ordinary shares of 1s. Solicitors: Swann, Hardman and Co., 10, Norfolk Street, Strand, London, W.C.2.

SOUTHAMPTON OXYGEN CO., LTD. To acquire from Liquid Air, Ltd., of 111, Salusbury Road, London, N.W., certain plant and machinery for producing oxygen, and to work such plant at Bitterne Quay, Southampton, or at such other place agreed upon with the said company. Nominal capital, £6,000 in £1 shares. A director: O. Simonis, 3, Belsize Square, London.